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# ACUTE APPENDICITIS*

BY

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"Let us return to our ideal; early operation is the only safe practice."—J. B. Murphy, 1916.

Since I was invited to take part in this discussion I have often wondered what induced the officers of the Section to choose this admittedly important subject. It appears to me that everything that can be said on appendicitis has already been much better said over and over again. Perhaps we are apt to forget that while the message is the same the audience is constantly changing.

It was Murphy of Chicago, one of the greatest teachers of all time, who declared that every few years important subjects in surgery should be reviewed and discussed so that the lessons connected with their management could be constantly kept before the profession. I am assuming that in discussing this matter we are but fulfilling this very proper idea.

Some time ago I was startled by the remark made by the husband of a very ill patient on whom I had operated for appendicitis with a complicating peritonitis, and who, unfortunately, succumbed. The man afterwards said how terribly disappointed he was, considering that his wife was *only suffering from such a simple thing as appendicitis!* I suppose it really means that as the great majority of the patients recover, when the result is otherwise everyone is surprised and disappointed. But, this being so, it shows how great is the responsibility laid on our shoulders. Yet in my view the real reason which justifies the discussion is because as a profession we cannot but be impressed by the individual tragedies to which we are unfortunately witness, and because we must feel in our heart of hearts that many of them might have been prevented.

### Mortality Statistics

After all, appendicitis is not inherently a serious disease, though its potentialities for evil are great and alarming. The Registrar-General has very kindly supplied me with figures which show that about 3,000 people die every year from appendicitis in the United Kingdom. This number represents 12 per cent. of all the deaths from gastro-intestinal disease and 0.61 per cent. of the total deaths registered. Some may think this is not as high as might be expected, but at the same time, since we must know that it is largely preventable, it is somewhat of a reproach to our profession. In order to endeavour to discover the mortality of the surgical treatment of this disease I have been furnished with statistics covering a period of five years from two of our great hospitals—the London Hospital and the Royal Victoria Infirmary, Newcastle-on-Tyne. The figures are as follows:

* Read in opening a discussion in the Section of Surgery at the Annual Meeting of the British Medical Association, Plymouth, 1938.

TABLE I.—*The Surgical Treatment of Appendicitis (Combined Figures for a Consecutive Five-year Period (1933–7) from the London Hospital and the Royal Victoria Infirmary, Newcastle-on-Tyne)*

| | No. | Deaths |
|---|---|---|
| Acute cases (excluding localized abscess) | 6,725 | 247 (3.67%) |
| Abscess cases .. .. .. .. | 604 | 51 (8.44%) |
| Above two groups (all acute cases) .. | 7,329 | 298 (4.07%) |
| All cases (acute, subacute, and interval) .. | 9,933 | 308 (3.10%) |

But I am not good at juggling with statistics, and I find that it is extremely difficult to get comparable figures from which one might draw perhaps some suggestive conclusions. I would, however, ask you to bear with me for a moment to consider some figures dealing with my own personal experience over the period of thirty-four years that I was in surgical practice in Newcastle-on-Tyne.

TABLE II.—*Appendicitis to End of 1934 (Newcastle-on-Tyne)*

| | No. of Cases | Deaths |
|---|---|---|
| Group 1: Acute appendicitis without peritonitis .. | 159 | 0 |
| „ 2: Acute appendicitis with localized peritonitis | 428 | 4 (0.93%) |
| „ 3: Acute appendicitis with flank or pelvic peritonitis, or both .. .. .. .. | 230 | 22 (9.56%) |
| „ 4: Acute appendicitis with diffuse peritonitis .. | 96 | 28 (29.2%) |
| „ 5: Appendicitis with residual abscess .. .. | 64 | 5 (7.81%) |
| „ 6: Appendicitis with primary localized abscess | 446 | 16 (3.59%) |
| „ 7: Appendicitis—interval removals .. .. | 1,080 | 4 (0.37%) |
| „ 8: Appendicitis with primary complications .. | 20 | 9 (45.00%) |
| „ 9: Appendicitis—no operation .. .. .. | 0 | — |
| „ 10: Appendicitis?—incidental removals .. | 0 | — |
| | 2,523 | 88 (3.49%) |

| | | | | |
|---|---|---|---|---|
| Groups 1 and 2 .. | 587 cases; | 4 deaths | (0.68%) |
| Groups 1, 2, and 3 .. | 817 „ | 26 „ | (3.18%) |
| Groups 1 to 6 and 8 (All acute cases).. | 1,443 „ | 84 „ | (5.82%) |
| All Groups .. | 2,523 „ | 88 „ | (3.49%) |

### The Classification of Appendicitis

So far as I am able to judge there can be no classification of appendicitis that is not open to error and to which objections cannot be raised. I can only suggest that the simple grouping employed has proved most useful. May I just point out that it is in no way selective and that, as it includes all the cases, anyone may draw their own conclusions from the information provided.

It will be noticed that the basis of the classification is a pathological one, for the disease starting in the appendix spreads from this area as a radiating infection. In the

great majority of cases appendicitis at its inception is a local disease, but when the infection spreads a secondary nidus arises in the peritoneum and in some cases in the blood stream. Group 5 includes those cases in which a more or less diffuse inflammation, as in Group 4, has fortuitously localized, but with abscess formation which is not necessarily around the appendix; it may be pelvic or subdiaphragmatic or in the flank. In Group 6, on the other hand, the inflammation has gone on to suppuration, but around the site of the appendix, wherever that organ may happen to be situated.

Group 8 comprises those cases in which there were primary complications—that is to say, in which patients have come under treatment suffering from appendicitis but with some such complication as acute intestinal obstruction, pylephlebitis, advanced cardiac disease, pneumonia, or some other such condition. Group 9 was intended to include cases in which no operation was carried out, lest one might be accused of improving statistics by refusing to operate on bad risks. But the cases in which I have not operated have usually been those who refused surgical intervention, and these have been so few that years ago I ceased putting them in the table.

The heading "incidental removals" (Group 10) is included to give me the opportunity of saying that we ought not to count these cases in the statistics of appendicitis. If whenever the appendix is removed in the course of some other abdominal operation it is counted as an example of appendicitis, we can soon accumulate a very large series, but such a series can have no value so far as the problem of the treatment of appendicitis as an entity is concerned. The record goes back for many years, and includes those early days when I was formulating rules for my own guidance and learning technique. Many of those early operations were carried out in small industrial houses or country cottages.

If you will look at the figures you will see that the cases which reach the surgeon at an ideal stage—that is to say, while the inflammatory trouble is strictly limited to the appendix or in its immediate neighbourhood—can be operated upon with a mortality considerably less than 1 per cent. even in a reasonably large series like the 587 set out in Groups 1 and 2. But the extension of the infected process to the unprotected peritoneum, which brings the patients into Group 3, immediately introduces new factors which have a very serious bearing on the outlook. The involvement of the peritoneum in the pelvis, on the flank, or both, creates a new infective focus which may not readily subside as the result of removal of the appendix, with or without drainage. It is this group that furnishes a large proportion of the complications which provide such serious problems for treatment. These factors are reflected in the mortality, which in this group approaches 10 per cent. In these cases the infected fluid is free in the peritoneal cavity, and they might quite fairly be classed as examples of unlimited peritonitis, many of which are potentially general. But even accepting these considerations, if we add these cases to those in Groups 1 and 2 we get a series of 817, with a mortality of 3.18 per cent. The object of the classification, however, is to include all the cases so that we get a true picture of the mortality. If we do this and only exclude the cases operated upon in a quiscent interval we get a series of 1,443 cases, including that unhappy group where there are primary complications, with a mortality of not quite 6 per cent. But my chief point is that as a profession we must never be satisfied until we can manage to get the great majority of cases treated by surgical means while they yet belong to Groups 1 and 2. If that could be done the experience of very many surgeons the world over shows that the mortality need not be more than 1 per cent. If this happy state can be brought about appendicitis might then be looked upon as the comparatively simple disease which it now is in the eyes of so many of the public. After all, the public look to us for guidance, and if it were universally insisted that very much better results would follow earlier intervention they would readily agree. To get the best results the co-operation of the public and of the profession is necessary.

In this matter of emergency surgery I do want to say what a great opportunity is presented in our large hospitals, or groups of hospitals like those under public authority control such as the L.C.C. or the Middlesex County Council. If agreement could be reached on a general classification which might be uniformly employed these hospitals could, in a few years, accumulate such a mass of statistics as would, let us hope, be useful in settling a good many problems which still remain unsolved. In this one respect we might take a lesson from Russia; I think it might be worth while. In their large emergency hospitals in Moscow they are trying out various methods of treatment checked by careful statistical records. It is a mass experiment which is extremely interesting, and may provide valuable guidance for the surgery of the immediate future.

### Stage at which to Operate

In suggesting that the main consideration is the stage at which the operation is carried out, one can find a useful, though not entirely parallel, comparison in the treatment of ruptured peptic ulcer, for in that condition nothing makes so much difference as the time which elapses between perforation and the intervention. Here again may I just trouble you to look at some figures bearing on the matter and which speak for themselves.

TABLE III.—*Perforated Gastric and Duodenal Ulcers (Combined Figures of Mr. Grey Turner and Mr. Norman Hodgson to End of 1929)*

| No. of Hours of Perforation in 6-Hour Periods | No. of Cases | Recoveries | Deaths |
|---|---|---|---|
| Up to 6 .. .. .. | 119 | 115 | 4 (3.36%) |
| 7 to 12 .. .. .. | 148 | 129 | 19 (12.83%) |
| 13 to 18 .. .. .. | 40 | 33 | 7 (17.5%) |
| 19 to 24 .. .. .. | 21 | 15 | 6 (28.57%) |
| Over 24 .. .. .. | 37 | 18 | 19 (51.35%) |
| Total .. .. .. | 365 | 310 | 55 (15.06%) |

All cases operated upon within twelve hours: 267 with 23 deaths (8.61%).

Why is it that so often surgery is not invoked while the disease is still limited to the appendix? I do not believe that the delay is so much due to mistaken diagnosis as it is to the expectation that the patient will get well without operative intervention. We all know that many sufferers do get well spontaneously, but at the same time I think we must admit that once the appendix has given trouble it is likely to do so again, and that it may be the cause of other troubles and is much better removed. Nevertheless, with the knowledge that many cases get well, it is perfectly reasonable that some patients, and often for the most excellent reasons, should wish to take the chance. But how are we to know that improvement is really taking place—what simple rule will guide us?

One of my former colleagues, the late Mr. W. G. Richardson of Newcastle-on-Tyne, to whom I am much indebted for many valuable lessons in emergency surgery, used to teach that in appendicitis it is unwise to conclude that natural recovery is taking place unless *all* the symptoms are improving. I have long been convinced of the great wisdom of this rule, and if it were always observed many a life would be saved and many a long illness prevented. It is not enough that pain is diminishing if the pulse is going up, or that the pulse remains unaltered if pain is becoming diffuse or the temperature is rising. The progress of the case is only sure if all the symptoms are simultaneously improving.

### Early Diagnosis

How are we to make the early diagnosis which will justify the prompt surgical intervention which is so important? Well, there are easy cases and difficult cases, and nobody is more ready to admit that I have often been confronted with problems in diagnosis which only an operation has solved. In the easy cases—and they are in the great majority—the cardinal symptoms, as set out by Murphy, will always be found, and they are so important that I make no apology for referring to them once again. These are pain in the abdomen, which may be sudden and severe but is rarely overwhelming; nausea or vomiting or some gastric disturbance with disinclination for food; general abdominal sensitiveness, sooner or later more marked over the right side; and elevation of temperature. Murphy insisted that the symptoms occurred in that order, and was accustomed to say, "When that order varies I always question the diagnosis." But every case must be carefully considered, and I would say without hesitation that it is often indiscriminate diagnosis rather than hasty operation which brings early intervention into discredit.

The history of the onset is important; it may be sudden and severe, or more gradual. In the former case the patient may look very ill, and I have always attached importance to the testimony of those who know the patient and who can say that the aspect is altered. The rise in temperature may be slight, and Murphy used to point out that it may sometimes only be detected per rectum; but none the less I agree that it is never absent. It must surely be universally realized that the pain may be entirely epigastric or just around the umbilicus; but, wherever the pain, the tenderness is found only at the site of the appendix, and that is usually in the region of the right iliac fossa. In the presence of an acute appendicitis the pulse may be little affected; but as the condition develops it invariably quickens, and a steadily rising pulse is a valuable collateral sign. The condition of the tongue is seldom mentioned; yet it is invariably slightly altered even in the early stages, and, though difficult to describe, there is something about it that seems to me characteristic when associated with the abdominal sequence on which Murphy so much relied.

It was my friend Arthur Burgess who first impressed on me that it is not necessary to wait for rigidity before making the diagnosis. The mere difference in resistance as compared with some other part of the abdominal wall is enough to guide the experienced observer. This is especially valuable in the pelvic and retrocaecal cases, where the appendix is hidden away from the abdominal wall.

I would also emphasize that in appendicitis the tenderness is easily evoked by light palpation, and I am always gravely suspicious of the diagnosis in those cases in which it requires a deep and perhaps rather heavy palpation to elicit this sign. Murphy used to be very bitter about the use of morphine in the treatment of suspected cases of appendicitis, and I well remember the cynical look on his face as he told his audience that patients so treated would recover in time to make excellent arrangements for their funeral! Rutherford Morison was equally emphatic, and used to tell us that if an abdominal pain was so severe as to require morphine for its relief then the case was one for operation. But in this matter my sympathies are entirely with the practitioner, for I know how insistent are the demands of the patient or the friends for relief. A single minimal dose of morphine may not mask the symptoms for too long, and as it wears off the return of pain is a certain sign of some grave condition, but the repeated small dose of morphine is fraught with great danger, and should never be employed when an abdominal emergency is in question.

It would go beyond the object I have in view to discuss the question of differential diagnosis, but there is one diagnosis that has certainly been responsible for many fatalities, and that is a diagnosis of abdominal influenza. I very much doubt if there is any such condition, and believe that it is usually only a handy explanation for some obscure inflammatory abdominal trouble, which in most instances has its origin in the appendix. From infancy to the age of 23 I myself suffered from numerous attacks which were confidently and repeatedly diagnosed as abdominal influenza but which were arrested for all time by the removal of a pathological appendix. But all cases have not so happy a sequel, and I could recount many tragedies due to this unfortunate diagnosis.

What can we do to help the young practitioner to recognize appendicitis at an early stage when operation is so insistent and so successful? Let us make more use of these common emergencies for teaching purposes. How often are we told on ward rounds that such and such a case is "only an appendix." These emergencies should be demonstrated to our students in all their aspects whenever the opportunity arises, and they should see the operations, watch the after-progress, and keep records of what are now looked upon as such ordinary conditions as to be scarcely worthy of notice.

### Treatment in Early Cases

The treatment of the cases in this comparatively early stage is very simple, for all that is necessary is to remove the appendix and when in doubt to put in a small rubber tube to act as a drain.

> "The state is best governed as you cook little fish, without much busyness."—Laotze.

It is perfectly true that there is often nothing to drain; but a small tube provides a track to the surface, and if the organisms do regain their activity after the removal of the offending organ such a track may mean an external discharge rather than an internal spread. At all events, I believe that a small tube properly placed often does good and never harm; but it should not be removed too soon, and I am accustomed to leave such tubes *in situ* for a week. If by that time there is no discharge they may safely be discarded. To the young surgeon I would most emphatically declare, when in doubt drain.

### Complications of Peritonitis and Abscess

While, however, it is our plain duty as a profession to do everything possible to make an early diagnosis and to act upon it by prompt surgical intervention, one must admit that many patients are not seen until there are complications like peritonitis and abscess. Even in these circumstances I am convinced that they should be

regarded in terms of what relief may be provided by operation. But here I think we must be wise and recognize that some little delay may be an essential part of the management of the case and may be to the great advantage of the patient. For instance, in peritonitis where the abdomen is grossly distended, there is frequent vomiting, the pulse is quick, and there is obvious toxaemia it is essential to keep the case under observation for a few hours. During this time certain measures should be employed which may help the patient towards recovery by localization or so far improve matters that the necessary intervention may be carried out with more chance of success.

The stomach should be emptied by tube and the rectum by glycerin enema, while toxins are diluted by giving water by the bowel or intravenously. It usually greatly adds to the comfort of these patients, and I think may do some good, to apply heat to the abdomen, and during this period of preparation, the diagnosis having been made, a small dose of morphine may be extremely valuable. If, as sometimes happens, there is great improvement in the course of a few hours it may be wise to wait; but again the dictum of W. G. Richardson is to be the guide, and, unless all symptoms improve, then it is much wiser to make a small incision merely with the idea of giving exit to peritoneal exudate. In these circumstances a small incision or incisions under local anaesthesia, with the insertion of a tube, is all that is justified. The question of the removal of the appendix must be left to a later date. If, on the other hand, the patient arrives with clear indications of a localized abscess, convalescence will be aided and recovery helped by the evacuation of pus.

I have twice in my life seen patients with such an abscess die suddenly from rupture of the collection into the peritoneal cavity while waiting for absorption to occur, and many times I have seen the inflammation gradually spread and convert a local process into a diffuse peritonitis. In many cases of localized abscess it is possible to do a complete operation in the sense that the appendix is removed, but whether that is advisable or not must depend a good deal on the judgment, and especially the experience, of the operator. The life-saving measure is the evacuation of the pus, and for that a small incision with the insertion of a drainage tube is all that is necessary. The stage at which to re-intervene for removal of the appendix is a matter worthy of comment; but I do not want to go into that now, because it will sidetrack our discussion from its essentials. It is significant that in the large series of cases of appendicitis which I have quoted from London and from Newcastle-on-Tyne the localized abscesses (604) were attended with a mortality of something over 8 per cent. More difficult cases are that type in which the patient arrives with a very hard, localized, scarcely tender swelling in the iliac fossa. In such cases it usually means that the pus has already safely found its way into the bowel, which is a much more common event than its mere absorption, as I have repeatedly been able to demonstrate. If all is going well then, of course, it may be wiser to wait and to deal with the removal of the appendix as an interval operation; but again, unless all the symptoms are improving, I would have no hesitation in urging intervention.

### The Late Stage

When can a case of appendicitis be said to be in a late stage? I have the greatest distrust of any rule in treatment which suggests that after a lapse of a certain number of hours operation is inadvisable. I can never understand the rationale of such a dictum unless supported by an enormous mass of the most accurate statistical evidence. It rather suggests the Gilbertian situation that whereas at a quarter to twelve on one day the case ought to be operated upon, when that hour has struck it is already too late and the patient will have a better chance if treated by other means! Pathological processes do not attend on the clock, and whereas in one case diffusion of infection will have taken place within a few hours, in another this event may be delayed for days or may never occur.

### Causes of Mortality

In endeavouring to evaluate the causes of the mortality I have been helped by my former assistant, Mr. A. Elliot-Smith, who has gone carefully into this matter in a considerable series of cases. His investigations tally with my own, to the effect that much of the mortality is due to complications. The main causes of death are undoubtedly an unarrested peritoneal infection, the formation of undetected abscesses in situations like the pelvis and the subdiaphragmatic areas, intestinal obstruction of various forms, cellulitis of the abdominal wall, and pulmonary infections. It is often suggested that the results of operations for appendicitis are largely influenced by the technique of the operator. This may have some bearing, but it is of very minor importance compared with the stage at which intervention is carried out. For instance, one operator, with certainly most excellent results, attributes a large part of his success to the fact that he never buries the stump of the appendix. I have always endeavoured to bury the stump, and I am equally satisfied that nothing but advantage has ever accrued to any of my patients from this step. I have lived too long in surgery to be influenced by the suggestion that any small detail of technique will alone make much difference in the mass results. All these things are of great interest, but I am equally certain that they are not essentials, and they must not be allowed to distract our attention from things that are.

I should be disloyal to my old school, however, if I did not once again urge the advantages of the oblique muscle-cutting incision of Rutherford Morison. For the early cases almost any type of incision will suffice, but for the later cases, and especially those presenting a lump, the oblique incision directly over the site of the mischief is much superior to any other. It has been a great satisfaction to me to find how readily my new associates at Hammersmith, who have all been trained in Southern schools, have appreciated the advantages of this approach. May I stress the importance of the careful closure of this incision in layers and with interrupted sutures of reliable stout catgut.

### Treatment in Special Circumstances

There are certain circumstances in which acute appendicitis occurs which introduce special features that may have a bearing on its treatment. First of all in children, it is universally admitted that there are many pitfalls in diagnosis and that the disease may progress with alarming rapidity. To my mind this knowledge emphasizes the extreme importance of care in diagnosis in these little people. I want particularly to insist on the equal importance of following up a diagnosis of probable acute appendicitis by operation. Although we are all aware that diagnosis in children is difficult, in Newcastle-on-Tyne I was impressed by the great frequency with which

appendicitis was ultimately proved in cases in which our contributing doctors had sent the patients into the hospital with that diagnosis. In children the symptoms may vary rapidly, and many such cases appeared to have little the matter by the time they reached hospital, but when operated upon I nearly always found the appendix grossly and unmistakably diseased. Often the child will appear to be quite well and to have nothing but a little remaining tenderness over the appendix, and yet the appendix may be perforated and surrounded by pus.

In old people the peritoneum seems to lose its powers of natural resistance, and I am again satisfied that we should not postpone an operation because a patient probably suffering from appendicitis is aged. We should rather say that advancing age is a factor which prompts early operation. No one with any experience will overlook the fact that in the aged there are special difficulties in diagnosis: bowel growths, diverticulitis, and even prostatic mischief have not infrequently misled.

When appendicitis is a complication of pregnancy it demands early operation. The course of the pregnancy will seldom be interrupted by such intervention, and, in any event, whatever the risk so far as that is concerned, it is probably much less than the risk of a recrudescence of the disease nearer term, during labour, or immediately after. In my own experience I have only once had a patient abort, and I feel sure that was due to delayed intervention rather than to the actual intervention itself. The same applies to patients with heart disease, asthma, and pulmonary infections. In such cases local anaesthesia will often enable us to carry out life-saving operations with little anxiety.

I think we must admit that there may be a variation in the virulence of appendicitis, not only at different ages and in varying circumstances, but from time to time, depending perhaps on the seasonal variation in the organismal invasions of the gastro-intestinal tract. I was persuaded that in Northumberland there was some difference as between the country people leading a healthy open-air life and the town-dwellers, and I am quite prepared to hear that these differences are met with in other parts of the country. But these possibilities do not affect the general rule as to the necessity of prompt operative intervention.

The difficulty about all the plans which countenance delay in the surgical treatment of appendicitis is that they are apt to be abused, for the public and a certain section of the profession are only too ready to find an excuse for adopting any treatment other than operation. It is for this reason that I am afraid of any attempt at differentiation as between the cases which ought to be treated immediately by operation and those which may be left to a more convenient season.

Murphy used to deplore what he called "epidemics of so-called conservatism" in dealing with appendicitis, and I have myself often pointed out that the recurring advocacy of a waiting policy or delayed operation has almost invariably been followed by a wave of increased mortality.

### Conclusion

Irrespective of interesting academic problems, I think it is essential that we should recognize that any acute condition of the appendix ought to be treated by operation without delay. I do hope that as the result of this discussion the message may once again go forth to the profession with no uncertain voice that appendicitis means operation, and that the earlier the operation the better the chance for the patient.

# CARBOHYDRATE METABOLISM IN ANAESTHESIA: A REVIEW*

BY

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The production of surgical anaesthesia by the administration of ether or chloroform is accompanied by various metabolic changes, among which may be mentioned a rise of blood cholesterol (Reicher, 1908; Ducceschi, 1919; Mahler, 1926), a rise of blood fat (Bloor, 1914), increased blood phosphate (Marenzi and Gerschman, 1934), a diminution of blood potassium (Marenzi and Gerschman, 1932), interference with water metabolism, leading to dehydration of the bodies of nerve cells (Barbour, 1931), and disturbance of the acid-base ratio of the blood (Stehle and Bourne, 1924). More than all these, however, certain aspects of the alterations in carbohydrate metabolism have received attention from clinicians and from experimental investigators. Of such changes the most striking and the most widely discussed is the hyperglycaemia fairly constantly produced by some forms of anaesthesia.

### Changes in the Blood Sugar

That the administration of ether produces in the dog both hyperglycaemia and glycosuria was shown by Seelig (1905, 1906). Macleod (1913) stated that anaesthesia induced but slight changes in the blood glucose, and two years later Macleod and Pearce (1915) reported that ether actually produces a fall in blood sugar during the first half hour of ether narcosis. Ross and McGuigan (1915), however, measured the hyperglycaemia produced by ether and chloroform and, later, Ross and Davis (1921) attempted to distinguish between the mechanism whereby blood sugar is raised by the two drugs. Since then it seems to have been universally accepted that ether causes hyperglycaemia. Some observers—for example, Mahler (1926), Mackay (1928), Mackay and Dyke (1928), Minnitt (1932), and Hospers (1933)—have recorded considerable increases in the blood sugar level, sometimes to more than 200 mg. per 100 c.cm.; others, such as Nakamura (1935) and Hasaura (1935), have not detected such large hyperglycaemic responses; whilst Pratt (1938) found that the effect of ether upon the blood sugar level may vary considerably from case to case, generally producing a moderate increase, sometimes not influencing it, and occasionally even producing a fall.

Much less information is available as to the hyperglycaemic potencies of the newer or less common anaesthetic agents. Acetylene (Fuss and Deura, 1932), ethylene (Hospers, 1933), and nitrous oxide (Minnitt, 1932; Hospers, 1933) all raise the blood sugar level, but not to the same extent as does ether. According to Prasad and Sen (1936) sodium evipan given intraperitoneally in the rabbit raises the blood sugar to a moderate degree, but the barbiturates, generally speaking (Heller and Nathan, 1933; Nakamura, 1935; Hasaura, 1935; Hrubetz and

* Read in the Section of Pharmacology, Therapeutics, and Anaesthetics at the Annual Meeting of the British Medical Association, Plymouth, 1938.

Blackberg, 1938), and avertin (Widenhorn, 1931; Nakamura, 1935) are thought to have little or no hyperglycaemic effect. It should be remembered, however, that the level of the blood sugar represents a dynamic equilibrium in which those factors tending to deplete it are balanced against those tending to replenish it, and that therefore the blood sugar level alone is not necessarily a simple or exact index of carbohydrate metabolism.

### Action of Adrenaline

A good deal of experimental investigation has been directed towards discovering the mechanism of the production of hyperglycaemia by anaesthetic agents, and so many explanations have been offered that the subject has become confused rather than clarified. Shaffer (1914), for example, concluded that the partial asphyxia commonly produced during attempts to hurry induction was responsible, although King, Moyle, and Haupt (1912) had already shown that this could not be a complete explanation, because ether given intravenously also produces some degree of hyperglycaemia under conditions in which asphyxia is avoided. It is well known that asphyxia does cause hyperglycaemia—for example, Hospers (1933)—but it does not follow that hyperglycaemia must be due to asphyxia.

A more acceptable hypothesis which has gained some currency is that anaesthetic agents bring about the release of adrenaline into the blood stream from the suprarenal glands at an augmented rate, and that this increased concentration of adrenaline in turn accelerates the disintegration of liver glycogen, so mobilizing glucose. This is no doubt partly true (Browne and Evans, 1933; Vidal, 1933; Banerji and Reid, 1933), at any rate during the early stages of anaesthesia when excitation of the autonomic nervous system may be expected to occur. Nevertheless, Mekie (1931) found that in the rabbit the hyperglycaemia due to ether anaesthesia is not prevented by adrenalectomy or by the administration of ergotoxine or atropine. He concluded that the autonomic nervous system cannot be implicated and that the hyperglycaemia cannot be due to the mobilization of adrenaline. The evidence is, perhaps, not altogether conclusive, for atropine and ergotoxine do not entirely abolish all activity of the autonomic nervous system, and adrenaline may be mobilized elsewhere than in the suprarenal glands, but it is sufficient to emphasize the unproven nature of the hypothesis that anaesthetic hyperglycaemia is due in the first instance chiefly or altogether to the liberation of adrenaline.

### Mobilization of Glucose from the Liver

The suggestion that anaesthetic agents mobilize glucose by a direct action on the liver has also been investigated experimentally. Linkoz (1926), for example, showed that various narcotics when perfused in moderate concentrations through the isolated frog's liver liberated glucose from that organ, and Fuss (1930) found that in the dog hepatic venous blood contains more glucose than portal venous blood during ether anaesthesia. Here again, however, matters cannot be regarded as settled. Ether and chloroform do not mobilize glucose from the isolated perfused liver of the dog (Ross, 1920) even when its glycogen content is normal. It has been claimed (Hrubetz and Blackberg, 1938) that the glycogenolytic power of the rabbit's liver is actually depressed by chloroform and various barbiturates, so that the hyperglycaemic effect of injected adrenaline is diminished. Mellanby (1919) concluded that since ether does not produce hyperglycaemia or glycosuria in the spinal animal its action cannot be directly on the liver, but is in fact on the bulb. According to Tuckett (1910) ether produces an acceleration of glycogenolysis not necessarily confined to the liver.

### Influence on the Action of Insulin

The question of the influence of anaesthetic drugs upon the action of insulin in the body has also been considered. Ross and Davis (1920) came to the conclusion that in the dog ether produces hyperglycaemia by hampering the action of insulin, but it has been shown (Chambers, Deuel, and Milhorat, 1927) that in the dog under amytal anaesthesia insulin has its usual hypoglycaemic effect, raising the respiratory quotient and increasing carbohydrate utilization as in the unanaesthetized animal. On the other hand, Aubertin and Trinquier (1933) concluded that chloralose actually enhances the effect of insulin in the dog. It may be stated that there is no indisputable evidence that anaesthetic agents interfere with the activity of insulin in the organism. The question as to whether anaesthetic drugs directly depress the pancreas and so diminish its output of insulin has not been adequately studied.

### Depressant Action of Anaesthetic Agents

It is fairly well established that most anaesthetic agents diminish the uptake of glucose by the tissues, although whether this of itself could be responsible for the observed hyperglycaemia is very doubtful. This depressant action has been demonstrated by measuring the uptake of glucose from the surrounding solution by the unicellular organism paramoecium in the presence and absence of ether or chloroform (Estes and Burge, 1928). A similar effect may be shown indirectly for mammalian tissue. Amytal does not raise the blood sugar, but the glycosuria and hyperglycaemia produced by continuous intravenous transfusion of glucose in the dog are greater when amytal is given than in the unanaesthetized animal (Hines, Boyd, and Leese, 1926; Wierzuchowski and Gadomska, 1927). This is good evidence that the ability of the tissues to utilize glucose is depressed even by amytal, although Lambie (1926), using the cat, concluded that ether and chloroform anaesthesia does not alter the rate of glucose uptake if the liver is excluded from the circulation. Hines, Leese, and Barer (1928) further showed that the increase of muscle glycogen produced by continuous intravenous transfusion of glucose is not affected by amytal, but that the increase in liver glycogen under these circumstances is halved by amytal anaesthesia. Fuss (1930) has also supplied evidence bearing on the relation of tissue glucose utilization to the hyperglycaemia of anaesthesia. He showed that in the phloridzinized dog ether does not raise the blood sugar, and deduced that the hyperglycaemia of ether anaesthesia is due to mobilization of glucose from the liver (rendered impossible, in phloridzin poisoning, by depleting the liver of glycogen) and not to any diminished utilization of glucose by the other tissues. Sansum and Woodyatt (1915) recorded a fall of blood sugar in phloridzinized dogs, brought about by ether and chloroform anaesthesia. Moreover, it has been shown that ether may not produce its customary rise of blood sugar in patients with hepatic disease (Canterow and Gehret, 1931).

### Breakdown of Carbohydrate

The careful work of Uchida (1926), using the rat, demonstrated that various anaesthetics, including ether and chloroform, diminish the free carbohydrate in the brain to some extent and the total glycogen of the brain

to a much larger extent. Liver glycogen is certainly diminished during anaesthesia. The actual depletion has been measured in nitrous oxide anaesthesia (Browne and Evans, 1933), in amytal narcosis (Evans, Tsai, and Young, 1931), and in ether anaesthesia (Macleod and Pearce, 1910). Ether also diminishes the glycogen of the muscles (Major and Bollman, 1932).

There is thus good evidence that ether and at least some other anaesthetic agents accelerate the breakdown of glycogen in the brain, the liver, the muscles, and, no doubt, in all the tissues of the body. The mechanism whereby this universal glycogenolysis is set in motion is imperfectly understood, but it is probably safe to assert that the central nervous system is involved, and that any direct toxic peripheral action of the anaesthetic drug is prominent only in overdosage and is in any case a late effect. It has been suggested (Pratt, 1938) that the partial breakdown of carbohydrate metabolism may be due to some extent to interference not so much with glycogen itself as with some phosphorylated derivative such as hexose phosphate. This is supported by the observation of Stehle and Bourne (1924) that the acidosis of ether anaesthesia is due to the discharge of phosphoric acid from the tissues, where normally it is concerned with carbohydrate metabolism, into the blood stream. It may be that the hyperglycaemia of some forms of anaesthesia is a compensatory mechanism designed to minimize the effects of anoxia upon nervous tissue. It is known that the sensitivity of the central nervous system to anoxia is greatly increased by hypoglycaemia (Gellhorn, 1938), and that hypoglycaemia as well as anoxia depresses the rate of oxidation in the central nervous system. It is interesting to note that the intravenous injection of glucose in the dog may shorten the period of barbital (veronal) anaesthesia by as much as 50 per cent. (Johnson, Luckhardt, and Lighthill, 1930). Although this effect was ascribed to diuresis, with an increased rate of elimination of the drug, some more specific action may be involved.

### Effect on Metabolism

According to Inami (1931) the degree of metabolic disturbance in anaesthesia is proportional to the depth of anaesthesia. This has been confirmed (Pratt, 1938) as far as the hyperglycaemia of ether anaesthesia is concerned.

Anaesthetic agents have an even more intimate and probably much more important influence upon carbohydrate metabolism than any yet touched upon. It is generally agreed that the only oxidative metabolism carried on by nervous tissue is carbohydrate oxidation (Himwich and Nahum, 1932), and this peculiarity clearly renders nervous tissue specially susceptible to any agent which interferes with intermediate carbohydrate metabolism. Indeed, the opinion is steadily gaining ground that anaesthetic drugs may exert their specific effect by inhibiting some phase of the series of reactions involved in the oxidation of carbohydrate in nerve cells. Jowett (1938), using brain slices, has shown that various anaesthetics reversibly inhibit these reactions, and he has proposed to explain narcosis on that basis.

### Conclusion

It may be permissible, in conclusion, in a paper that records so much of doubt and so little of certainty, to indulge in one further speculation. According to Mann, Tennenbaum and Quastel (1938), a precursor of acetylcholine exists in brain tissue. This "acetylcholine precursor" is synthesized when carbohydrate oxidation is occurring, but is not formed under anaerobic conditions. Similarly, MacIntosh (1938) has recently shown that the production of acetylcholine *and the transmission of impulses* by the superior cervical ganglion is dependent, at least in part, upon the presence of glucose. It is an attractive hypothesis that anaesthetic drugs produce anaesthesia by diminishing the amount of available acetylcholine as a result of cessation or diminution of carbohydrate oxidation, and so preventing the transmission of impulses at synapses in the central nervous system. If this or some such mechanism should prove to be the case it would mean that at last we should have arrived at a theory of anaesthesia capable of being stated in current physiological terminology.

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# USE OF THE BACTERIOPHAGE IN AN OUTBREAK OF INSTITUTIONAL DYSENTERY

BY

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Dysenteric infections in homes and hospitals for sick children are common and very hard to control. These difficulties were accentuated in the outbreak here described, as it happened in a home for blind babies. It was inadvisable to close the home, and impossible, as will be explained, to secure effective isolation. In these circumstances treatment with bacteriophage was assiduously carried out in the hope that the infectivity of those affected might be reduced by some alteration in the bacteria, such as is supposed to be produced by the action of the bacteriophage upon micro-organisms. So successful does this appear to have been that the experience seems worthy of record.

The home had thirty-two blind children aged from a few months to 7 years. It is managed by a devoted matron, with a staff of eight skilled nurses, three teaching staff, and five domestics. All are under the regular medical supervision of an experienced local medical practitioner, with ready access to consultant advice. The medical officer is a regular visitor to the home.

## The Cases

The first patient, on February 20, 1937, was hardly ill at all, although there was a little blood in the stools. This child was not suspected of having dysentery, and after a few days' segregation was allowed to join the other children freely. Whether there was a connexion between this case and the epidemic that followed six weeks later is uncertain, but the child was again ill on April 22. On the latter occasion the first stool to be examined showed no dysentery bacilli, but on April 25 *B. dysenteriae* Sonne was obtained (Table I, Case 4).

TABLE I.—*Cases from which B. dysenteriae Sonne and/or "Atypical" Bacilli were Obtained*

| Case No. | Date | Result of Stool Examination | Examined by |
|---|---|---|---|
| 1 | 5/4/37 | Sonne present | Dr. Selous |
| | 2/5/37 | " " | D.H. |
| | 7/5/37 | " " | D.H. |
| | 20/5/37 | "Atypical" bacilli present | D.H. |
| | 27/5/37 | Negative for dysenteries | D.H. |
| 2 | 12/4/37 | Sonne present | Dr. Selous |
| | 25/4/37 | "Atypical" bacilli present | D.H. |
| | 7/5/37 | Sonne present | D.H. |
| | 24/6/37 | "Atypical" bacilli present | D.H. |
| | 7/7/37 | Negative for dysenteries | D.H. |
| 3 | 18/4/37 | Sonne present | Dr. Selous |
| | 4/5/37 | " " | D.H. |
| | 19/5/37 | Negative | D.H. |
| 4 | 22/4/37 | Negative | Dr. Selous |
| | 25/4/37 | Sonne present | D.H. |
| | 14/5/37 | Negative | D.H. |
| 5 | 25/4/37 | Sonne present | D.H. |
| | 6/5/37 | Negative | D.H. |
| 6 | 25/4/37 | Negative | D.H. |
| | 6/5/37 | "Atypical" bacilli present | D.H. |
| | 7/7/37 | Negative | D.H. |
| 7 | 25/4/37 | "Atypical" bacilli present | D.H. |
| | 24/5/37 | " " " | D.H. |
| | 3/6/37 | " " " | D.H. |
| | 7/7/37 | Negative | D.H. |
| 8 | 25/4/37 | Sonne present | D.H. |
| | 10/5/37 | Negative | D.H. |
| 9 | 25/4/37 | "Atypical" bacilli present | D.H. |
| | 6/5/37 | Negative | D.H. |
| 10 | 25/4/37 | "Atypical" bacilli present | D.H. |
| | 6/5/37 | Negative | D.H. |
| 11 | 27/4/37 | Sonne present | D.H. |
| | 27/5/37 | Negative | D.H. |

Following this presumed first case, on February 20, there were three cases on April 4 and 5. Of these, two were mild and one moderately severe. The last-mentioned case passed blood and mucus, and from a specimen of the stool Dr. Selous isolated *B. dysenteriae* Sonne (Table I, Case 1). After an interval of four days there were four more cases on April 10 and 11. From the stools of two of these *B. dysenteriae* Sonne were obtained (Table I, Cases 2 and 3), and from the other two "atypical" dysentery bacilli—that is, Gram-negative, non-motile, non-lactose-fermenting bacteria, which fermented mannitol with the production of acid only, but did not, however, conform to any of the recognized dysentery strains: they failed to agglutinate with standard Oxford sera for the Sonne, Shiga, or Flexner groups. Three of these four cases were febrile and toxic, and a tendency to cyanosis was a feature of their condition.

A week later, April 18, another febrile case of dysentery occurred, and from this also *B. dysenteriae* Sonne were obtained (Table I, Case 3). On the 22nd the first case was again reported ill. This was a mild attack. The first stool examined gave a negative result, but from a stool on April 25 *B. dysenteriae* Sonne were obtained (Table I, Case 4). It is possible that this patient may have harboured *B. sonnei* from February 20 and thus have been the source of the other infections. Whence her infection came in the first instance could not be ascertained. On April 25 three more cases occurred (Table I, Cases 7, 9, 10). Two of these patients were nurses (Table I, Cases 9, 10), only slightly indisposed, but from them "atypical" dysentery bacilli were obtained. The accompanying chart conveys a clear idea of the pattern of the epidemic.

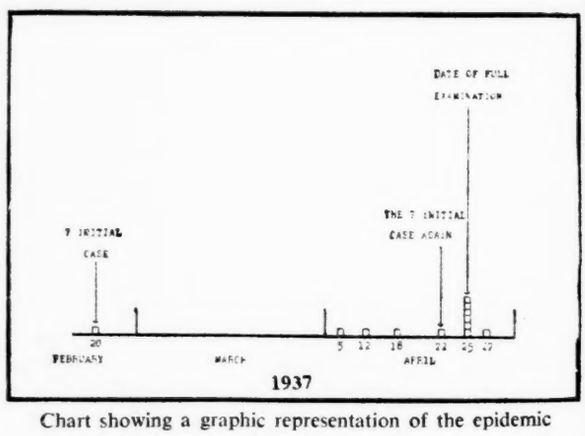


Chart showing a graphic representation of the epidemic

## The Investigation

On April 25 I was consulted by Dr. Eric Pritchard, and was asked to investigate and to suggest a way of dealing with the outbreak. The home is situated in a very commodious and well-converted mansion, standing in its own extensive and attractive grounds. The appended sketch-plans of the two lower floors show the internal arrangements, and it will be seen how difficult was the problem of effective isolation in this epidemic. The water supply was from the town mains. There was no evidence of any epidemic in the rest of the area supplied. The milk was from local farms. It was not pasteurized, but was sterilized by boiling when received at the home.

These blind children are encouraged to lead as normal a life as possible. Vision, of course, plays a major part in the education of children; but in blind children this is perforce replaced by stimuli from touching, tasting, smelling, and hearing. It is desirable that they handle everything, and inevitable that they taste many things. Hence the control of an epidemic of a highly infective disease offers even more difficulties than those met with in institutions for more normal children.

Owing to the peculiar nature of the home there is no ward for the treatment and efficient isolation of cases of sporadic disease, and great reliance has to be placed upon "bed-isolation" (always a matter of difficulty, but more so in an institution of this kind).

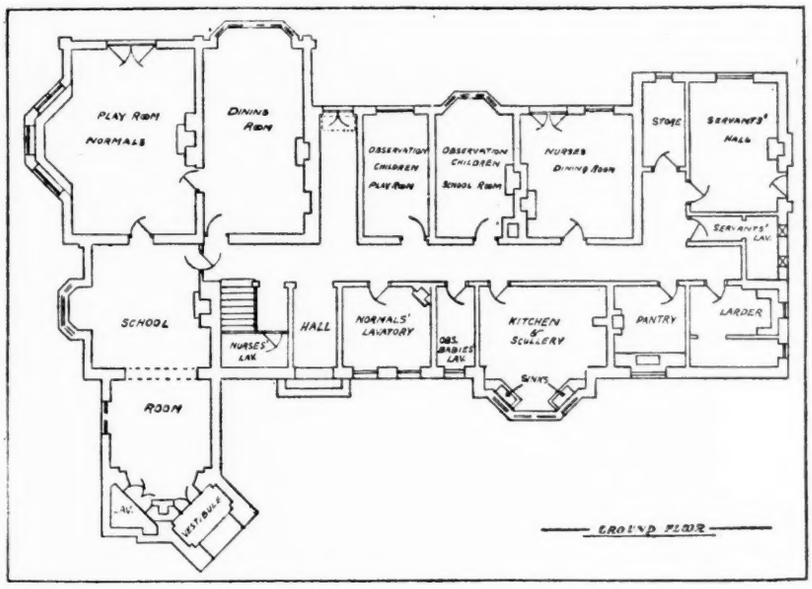


FIG. A.

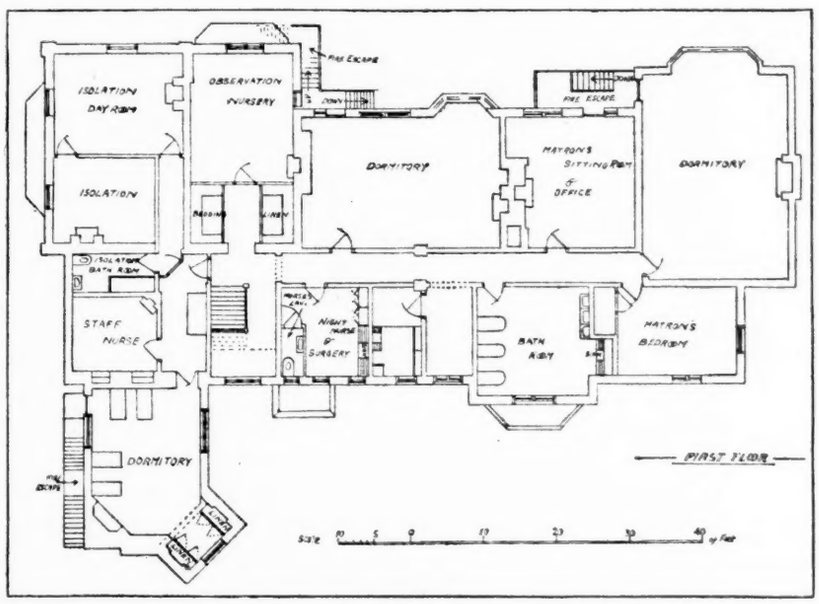


FIG. B.

Cases 9 and 10 were nurses, and were at no time really ill; they harboured "atypical" bacilli, and would never have been found had it not been possible to examine the stools of all the inmates and staff. Every case discovered at this time, with the exception of Case 11, was of the minor or carrier type, and in the ordinary course of events such cases would certainly have been overlooked.

There were then, on April 27, seven cases either known to have had dysentery or found on that date to harbour dysentery bacilli; one child negative on culture who subsequently developed the disease (Table I, Case 11); and two nurses (Cases 9, 10), who were shown to harbour "atypical" dysentery bacilli. The remainder of the children (twenty-two) were hitherto unaffected and presumably healthy. There were also seventeen nursing, teaching, and domestic staff. Efficient isolation seemed impossible without upsetting the routine of the home and thus nullifying much of the laborious and excellent work of the devoted staff, who were doing all that seemed possible to segregate the sick. It was very undesirable to close the home and disperse the children to isolation hospitals.

### Treatment

Accordingly I recommended that those who had been sick, those unaffected and therefore presumably at risk, and all the staff should receive one dose of a reliable anti-dysentery bacteriophage three times daily for a fortnight, and thereafter one dose daily. All those in bed and upon bed-isolation received one dose of the bacteriophage three times daily until the stools were reported "free from *B. dysenteriae* Sonne, and from 'atypical' dysentery bacilli."

An examination of the stools of all the inmates and staff was begun. In the first batch of stools examined on April 25, 1937, there were thirty-six specimens—eighteen from child inmates and eighteen from the adult staff. Of this batch three were positive for *B. dysenteriae* Sonne and two showed "atypical" dysentery bacilli (these were the two nurses). The rest did not show dysentery organisms. On May 4 four more specimens were examined; of these only one showed *B. dysenteriae* Sonne. On May 7 eight more stools were examined and two showed *B. dysenteriae* Sonne. The examinations were continued at varying intervals until, at the end of the epidemic on July 7 a total of sixty-six stools had been examined.

Bacteriophage treatment of the sick was started on April 25 and was extended to the whole institution on April 27. On the latter day, the second day after treatment was begun, one further case occurred. This was the last; and now, over a year later, there has been no fresh case.

This sudden cessation of the epidemic may have been a coincidence: but there was nothing to suggest that the cases between April 4 and 27 were being infected from

outside the home. The repeated findings of *B. dysenteriae* Sonne suggested that this infection was being spread. The "dropping" cases during the three weeks were what might be expected in an outbreak spread by contact infection; and even though the separation of the healthy from the sick was tightened up, the activity of these children, unbelievably quick in touching, smelling, and putting things into their mouths, made the transfer of infection probable.

The treatment aimed at the bacillus causing the disease: it sought by the action of the bacteriophage to modify the bacillus, and thus render it less capable of giving rise to dysenteric infection. Some modification did apparently occur, as towards the end of the epidemic there were more "atypical" bacilli and steadily fewer typical dysentery bacilli isolated. There was no change in the technique used, so it appears that the modification was truly in and of the bacilli. (It is open to argument whether "atypical" dysentery bacilli can be produced from *pure strains* of known dysentery organisms, but there is some evidence in the authorities which appears to support the proposition.) No medicinal treatment other than bacteriophage was administered. No case was removed from the home. Inquiries at the home at the end of April, 1938, elicited that no further case had occurred.

The bacteriophage was prepared at the Usher Institute of Public Health, Edinburgh. In its preparation races of bacteriophage active against strains of dysentery occurring in this country are largely used, and these include *B. dysenteriae* Sonne from a variety of sources.

I should like to express my thanks to Dr. Eric Pritchard for consulting me about this outbreak, for allowing me to use the bacteriophage treatment, and for his never-failing help and consideration in this and other matters; to Lieutenant-Colonel J. Morison, to whom I am indebted for the supply of bacteriophage, and much kindly help, advice, and friendly criticism; to Dr. W. E. Wallis, medical officer at the home, for his courteous assistance, for the efficient supervision of the outbreak, and for placing his records at my disposal; to the National Institute for the Blind for allowing the publication of this paper and for so readily supplying plans, documents, etc., relevant to this work; and, finally, to Mr. H. Clouston, my senior technician, for invaluable help in the isolation of the dysentery bacilli, and to the other members of my staff for their technical assistance.

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"Problems of the Nations" will be discussed in a series of talks to be held in the Halls of City Livery Companies in aid of King Edward's Hospital Fund for London. The subjects will be "China" on October 6 in the Hall of the Vintners' Company; "Russia" on October 26 in the Hall of the Goldsmiths' Company; "Eire" on November 10 in the Hall of the Clothworkers' Company; and "Czechoslovakia" on November 24 in the Hall of the Drapers' Company. Ticket holders will be given an opportunity of seeing the premises and historical relics before the talks, which begin at 5.30 p.m. Further information and tickets (price 3s. 6d.) can be obtained from the Secretary, King Edward's Hospital Fund for London, 10, Old Jewry, E.C.2.

# OBSERVATIONS ON THE POTENCY AND STABILITY OF DICK TEST TOXINS

BY

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The Dick test is less reliable than the Schick test, and is therefore employed much less in clinical work. From time to time questions are asked about the possibility of improving the Dick toxin used clinically in many hospitals in this country. Is it of optimum potency at the time of preparation, and does the diluent ensure that undesirable deterioration does not occur before use?

We have recently been able to compare the potency of two toxins, one of which, Toxin A, was diluted in boric acid borate buffer solution (B.B.S.), and the other, Toxin B, in 0.4 per cent. phenol saline and in B.B.S. The former toxin is the preparation now used clinically by many workers in this country. We have taken the opportunity to inquire into the stability of the various reagents and also to endeavour to assess the error of the skin method of comparing two toxins in human subjects.

## Reagents and Technical Details

The following toxin dilutions were available for injection:

1. Toxin A, diluted in B.B.S. 2 to 3 days previously
2. " " " " " 1 month "
3. " B, " " phenol saline 2 to 3 days previously
4. " " " " " " 1 month "
5. " " " " B.B.S. 2 to 3 days previously
6. " " " " " 1 month "

Dilutions 1, 3, and 5 were posted on the day of preparation, and dilutions 2, 4, and 6 had been kept at 4° C. for four weeks and were sent by post at the same time as dilutions 1, 3, and 5. The tests were made on the anterior surfaces of the forearms of Dick-positive individuals, separate syringes being used for each dilution. The sites of injection varied in different patients; thus a dilution might be injected on the forearm near the elbow in one patient and near the wrist in another. Readings were made after sixteen to twenty-four hours, the key to the order of injections being unknown to the persons making the readings. Throughout the investigation the greatest care was taken to exclude conscious and unconscious bias. The dimensions of the reactions were recorded in millimetres and notes made of their intensity.

## Results

An analysis of the comparisons made at the different hospitals is shown in the table.

The following conclusions may be drawn:

1. Toxin A is considerably stronger than Toxin B.

2. Toxin A deteriorates slightly after four weeks in cold storage followed by two to three days at room temperature.

3. Toxin A which has been kept for one month is still considerably stronger than Toxin B freshly prepared.

4. Toxin B deteriorates slightly after four weeks in cold storage followed by two to three days at room temperature.

5. B.B.S. is a more suitable diluent than phenol saline for Toxin B. It ensures less deterioration after (*a*) two to three days at room temperature, and also after (*b*) four weeks at 4° C. followed by two to three days at room temperature.

*Comparison of two Dick toxins, A and B, diluted in B.B.S. or 0.4 per cent. phenol saline (a) two to three days before injection, and (b) one month before injection*

| | Observers | | |
|---|---|---|---|
| | M.L. | McG. and K. | R. |
| A (B.B.S.) 2–3 days > B (phenol) 2–3 days .. | 11 | 18 | 16 |
| " " " " < " " " " .. | 0 | 0 | 0 |
| " " " " = " " " " .. | 2 | 0 | 0 |
| A (B.B.S.) 2–3 days > A (B.B.S.) 1 month .. | 2 | 12 | 4 |
| " " " " < " " " " .. | 4 | 2 | 2 |
| " " " " = " " " " .. | 7 | 4 | 10 |
| A (B.B.S.) 1 month > B (phenol) 2–3 days .. | 11 | 18 | 16 |
| " " " " < " " " " .. | 0 | 0 | 0 |
| " " " " = " " " " .. | 2 | 0 | 0 |
| B (phenol) 2–3 days > B (phenol) 1 month .. | 6 | 7 | 1 |
| " " " " < " " " " .. | 2 | 3 | 3 |
| " " " " = " " " " .. | 5 | 2 | 12 |
| B (phenol) 2–3 days > B (B.B.S.) 2–3 days .. | 4 | 1 | 0 |
| " " " " < " " " " .. | 4 | 9 | 10 |
| " " " " = " " " " .. | 5 | 0 | 6 |
| B (phenol) 1 month > B (B.B.S.) 1 month .. | 1 | 2 | 1 |
| " " " " < " " " " .. | 5 | 6 | 8 |
| " " " " = " " " " .. | 7 | 0 | 7 |

The toxins were supplied to the various hospitals in sealed glass phials and in rubber-stoppered bottles. There did not appear to be any significant difference between the results obtained with toxins from the two types of container, which were disregarded when the above table was compiled.

### Discussion

From the combined research it is obvious that one has to use large numbers of persons in comparing the dilutions which were supplied of Dick toxins A and B. Discrepancies are apparent in an analysis of the data from different hospitals, and indicate the need for care in the interpretation of comparisons based on small groups. At the same time undue emphasis must not be placed on the discrepancies reported by different workers. Many of these were explained by a difference in measurement of a very few millimetres, as was evident from the original protocols (unpublished).

The influence of the diluents is also of interest. Boric acid borate buffer solution, which is now used in Great Britain, is a better stabilizing agent than phenol saline. A similar conclusion was reached by O'Brien, Okell, and Parish (1928), although in their early work a slightly higher concentration of phenol was used and a more rapid deterioration of toxin was observed. It is now well known that phenol is an unsuitable antiseptic for various other toxins—for example, diphtheria and tetanus—and for such immunizing agents as diphtheria prophylactic, A.P.T., which may lose its antigenicity rapidly in the presence of phenol.

A comparison of various Dick toxins has also been made by Ker (1937), who commented on the stability of the material used in his tests. His work emphasizes, too, the necessity for tests on a large group of persons in any investigation of this type.

With regard to the strength of Dick toxin used normally in our clinical work, the dramatic reduction of scarlet fever among nursing staffs after the introduction of the Dick test and active immunization indicates clearly that a Dick-negative staff of nurses has a high degree of protection against infection; but we have seen a small number of relapses to Dick-positive and a few cases of scarlet fever among nurses who had formerly, or recently, been Dick-negative. On reviewing all the evidence, however, the results of immunization indicate that the Dick toxin used is of satisfactory potency.

### Summary

1. In comparing two different samples of Dick toxin, tests on small groups of persons may be misleading. We would emphasize the need for making a considerable number of tests if an accurate result is required.

2. Boric acid borate buffer solution is a preferable diluent to 0.4 per cent. phenol saline, since it ensures greater stability.

3. The Dick toxin A, used normally in our clinical work, is of satisfactory potency and stability. Negative reactions with this toxin indicate a high degree of protection, although we have observed a few cases of scarlet fever in Dick-negative nurses.

We are indebted to Dr. R. A. O'Brien and Dr. H. J. Parish of the Wellcome Physiological Research Laboratories for the Dick toxins and diluents used for the tests.

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## A NOTE ON DIPHTHERIA IMMUNIZATION IN LONDON

BY

**MAX SORSBY, L.M.S.S.A.**

The increasing attention that is being paid by public health authorities to the immunization of children against diphtheria and the satisfactory results that have been obtained by various authorities in the reduction of the incidence of the disease by this procedure have led to the present study of the extent of diphtheria immunization in the child population of London. Diphtheria is a problem of no mean order in the metropolis. For the decennial period 1926–35 the following yearly averages for the County of London show the extent of morbidity and mortality.

| | |
|---|---|
| Approximate population (0–15 years) .. .. .. | 1,000,190 |
| Diphtheria cases .. .. | 9,047 (Attack rate of 9.04 per 1,000) |
| Deaths .. .. .. | 367 (Death rate of 3.65 per 10,000) |
| Case mortality, per cent. .. | 4.05 |

Immunization is carried out in the County of London mainly by the authorities of the different metropolitan boroughs. Holborn has provided facilities since 1922, and it was some years before other authorities followed: even now Bethnal Green has no local facilities, but makes arrangements for applicants to be immunized elsewhere. By reason of this lack of uniformity a much larger number of children are immunized in some parts of London than in others. Taking all the London boroughs together, by the end of 1935 there were 29,616 children potentially protected against diphtheria, either because of a natural immunity or as a result of immunity acquired by inoculation. The proportion of naturally immune children is not insignificant, for of nearly 30,000 no fewer than 4,698 were found Schick-negative at the primary test. On this basis something like 20

per cent. of the child population in London is naturally immune. It is generally agreed that for the diphtheria mortality rate to be tangibly affected at least 50 per cent. of the child population must be immune. There is therefore a wide gap to be bridged—one of at least 30 per cent. Thus, taking the figures up to 1935, it would appear that only a very small proportion of the child population has so far been artificially protected—actually not more than 2.3 per cent.

### Recent Increase in Rate of Immunization

Since 1935 diphtheria immunization has been practised on an ever-increasing scale, so that this small percentage is no longer valid. In 1936 about 3,000 more children were protected, and whilst the figures for 1937 are not yet available, there can be no question that this number has been surpassed. As emphasizing the increasing rate at which immunization is being practised, it is worth pointing out that whilst in 1930 there were about 9,000 protected children, by the end of 1935 this figure was nearly trebled, and in the two years 1936–7 as many children were protected as in the preceding five years. The L.C.C. has carried out immunization among the inmates of its institutions since 1932, and by the end of 1936 approximately 10,000 children had been successfully immunized. Adding these figures together, it would appear that at the present moment about 55,000 to 60,000 children in the London area have been actively protected, representing approximately 5 to 6 per cent. of the child population. If the 20 per cent. or so of the naturally immune children are added to this there remain about three-quarters of the child population not protected. In view of the risk run by the unprotected, an intensive effort towards popularizing immunization seems to be called for. The experience of Dublin, where, in the second half of 1935, 25,000 children were immunized, including 4,500 under school age, illustrates what can be achieved. In Chester about 45 per cent. of the child population and in Birmingham about 35 per cent. have been immunized. There does not appear to be any reason why other local authorities cannot do as well or even better.

The following table gives a detailed analysis of the extent of diphtheria immunization undertaken by the

## COUNTY OF LONDON

*Diphtheria Immunization. Totals to end of 1935*

| Local Sanitary Authority | Approx. Average Population 0-15 Years 1926-35 | Date of Commencement of Immunization | Numbers Schick-negative at Primary Test | Numbers Given Full Course of Prophylactic | Numbers Fully Inoculated and Subsequently Schick-negative | Cases of Diphtheria Reported among Immunized | Diphtheria Attack Rate per 1,000 Immunized | Deaths from Diphtheria among Immunized Children | Total Known to be Protected (Immunized or Schick-negative at Primary Test) | Percentage of Known Protected to Total Population (0-15 Years to End of 1935) | Number Potentially Protected |
|---|---|---|---|---|---|---|---|---|---|---|---|
| City of London .. | 1,400 | 1935 | None tested | 26 | 24 | 0 | — | — | 24 | 1.71 | 26 |
| Battersea .. .. | 37,700 | 1927 | 230 | 1,297 | 1,027 | 4 | 3.89 | — | 1,257 | 3.33 | 1,527 |
| Bermondsey .. .. | 31,500 | 1929 | 91 | 295 | 295 | 1 | 3.39 | — | 386 | 1.23 | 386 |
| Bethnal Green* .. | 30,500 | | | | | | | | | | |
| Camberwell .. .. | 59,000 | 1926 | 361 | 1,369 | 1,028 | 4 | 3.89 | — | 1,389 | 2.35 | 1,730 |
| Chelsea .. .. | 9,800 | 1934 | 22 | 215 | 184 | 0 | — | — | 206 | 2.10 | 237 |
| Deptford .. .. | 26,300 | 1927 | 316 | 950 | 384 | 0 | — | — | 700 | 2.66 | 1,266 |
| Finsbury .. .. | 19,130 | 1928-31 / 1934 | 24 | 143 | 96 | 0 | — | — | 120 | 0.63 | 167 |
| Fulham .. .. | 33,230 | 1934 | 219 | 757 | 619 | 0 | — | — | 838 | 2.52 | 976 |
| Greenwich .. .. | 26,300 | 1936 | — | — | — | — | — | — | — | — | — |
| Hackney .. .. | 49,670 | 1928 | 1,043 | 4,510 | 3,817 | 6 | 1.57 | — | 4,860 | 9.78 | 5,553 |
| Hammersmith .. | 30,500 | 1935 | 22 | 1,170 | 546 | 0 | — | — | 568 | 1.86 | 1,192 |
| Hampstead .. .. | 13,300 | 1933 | — | 603 | 218 | 0 | — | — | 218 | 1.63 | 603 |
| Holborn .. .. | 6,160 | 1922 | 384 | 1,542 | 1,170 | 4 | 3.42 | — | 1,554 | 25.2 | 1,926 |
| Islington .. .. | 75,150 | 1936 | — | — | — | — | — | — | — | — | — |
| Kensington .. .. | 32,000 | 1934 | 102 | 2,318 | 1,657 | 1 | 0.60 | — | 1,759 | 5.5 | 2,420 |
| Lambeth .. .. | 67,650 | 1928 | 849 | 2,164 | 1,970 | 0 | — | — | 2,819 | 4.16 | 3,013 |
| Lewisham .. .. | 53,300 | 1935 (June) | 36 | 236 | 235 | 0 | — | — | 271 | 0.5 | 272 |
| Paddington .. .. | 25,300 | 1933 | 322 | 664 | 627 | 4 | 6.37 | — | 949 | 3.75 | 986 |
| Poplar .. .. | 45,000 | 1928-30 / 1933-35 | 58 | 215 | 202 | 0 | — | — | 260 | 0.57 | 273 |
| St. Marylebone .. | 15,400 | 1928 | 107 | 2,132 | 1,451 | 3 | 2.07 | — | 1,558 | 10.12 | 2,239 |
| St. Pancras .. .. | 41,800 | 1936 | — | — | — | — | — | — | — | — | — |
| Shoreditch .. .. | 28,650 | 1933 | 262 | 588 | 197 | 1 | 5.10 | — | 459 | 1.60 | 850 |
| Southwark .. .. | 45,800 | 1929 | 315 | 1,726 | 1,232 | 2 | 1.62 | — | 1,547 | 3.37 | 2,041 |
| Stepney .. .. | 61,100 | 1936 | — | — | — | — | — | — | — | — | — |
| Stoke Newington .. | 10,000 | 1927 | 68 | 537 | 512 | 0 | — | — | 580 | 5.80 | 605 |
| Wandsworth .. .. | 71,700 | 1928 | 1,258 | 5,362 | 4,013 | 9 | 2.24 | — | 5,271 | 7.35 | 6,620 |
| Westminster, City of | 16,400 | 1926 | 327 | 1,619 | 833 | 2 | 2.40 | — | 1,070 | 6.53 | 1,856 |
| Woolwich .. .. | 36,450 | 1934 | 172 | 1,135 | 781 | 0 | — | — | 953 | 2.61 | 1,307 |
| | 1,000,190 | 1922-35 | 6,588 | 31,573 | 23,118 | 41 | 1.77 | — | 29,616 | 2.96 | 38,071 |

* No facilities for immunization yet in Bethnal Green. Applicants are referred to the Hospital for Sick Children, Great Ormond Street.

metropolitan boroughs up to 1935. It will be seen that in comparison with the general child population the incidence of diphtheria among immunized children is distinctly low (an attack rate of 1.77 per 1,000 immunized against 9.04 for the general child population) and that there has not been a single death from diphtheria in the forty-one cases occurring in the immunized group.

I am indebted to the Special Hospitals Department of the London County Council for the information contained in the table, and to Dr. G. H. Dart, medical officer of health for Hackney, for much helpful advice.

# VASOMOTOR RHINORRHOEA, WITH ASTHMA, ASSOCIATED WITH MENSTRUATION

BY

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The relation between nasal disorders and activity of the sexual organs, both in the male and in the female, was recognized by Hippocrates, Celsus, and Aristotle, and also in the Ayurveda, the ancient Hindu medical classic. J. N. Mackenzie (1884), an ear, nose, and throat surgeon of Baltimore, was the first writer of more modern times to make a systematic clinical study of this subject and to survey the literature. He observed in a certain number of women, whose nasal organs were otherwise healthy, that the nasal erectile tissue became congested at the time of the period, and even when the period was expected but happened temporarily to be suppressed. He said that his own experience was not great enough for him to say whether these changes also took place during pregnancy; but they have now, in fact, been seen to occur (Mortimer, Wright, and Collip, 1936a, 1936b, 1937). Moreover, the change is a steadily progressive one, with exacerbations when the periods would have been expected to be due but for the pregnancy. Mackenzie was of the opinion that nasal congestion was not confined only to women at the time of the periods, but that it might also occur during or after sexual activity in both sexes.

For fifty years the significance of Mackenzie's and other similar work has passed unnoticed and unexplained, but these clinical observations have now acquired a fresh significance in the light of recent advances in endocrinology, and are supported by a large body of experimental evidence, obtained mostly from work on monkeys (Mortimer *et al.*, 1936a, 1936b, 1937).

### Hormonic Action on the Nasal Mucosa

Nasal turgescence is one of the "specific skin responses" to increase of circulating sex hormone occurring at oestrus. It can be provoked by injection of the appropriate oestrogenic hormones into male and female monkeys, including, as controls, those which are immature or castrate. Specific skin reactivity can be shown by simple transplantation experiments, where, for example, a piece of specific skin transplanted into a non-specific area still shows the specific response, and vice versa. Thus, non-specific skin transplanted into the perineal area of a monkey stands out as a "pale island of skin in brilliantly coloured surroundings" (Bachman, Collip, and Selye, 1936).

This specific action of oestrogenic hormones on the nasal mucosa has been investigated and put to a therapeutic purpose by Collip and his co-workers in cases of atrophic rhinitis and ozaena. They observed much improvement after a course of local application of the hormones (oestrone or oestradiol in an oily solution). Incidentally, this series of cases showed an unusually high percentage of deafness and otosclerosis, which in a few cases responded to treatment, although otosclerosis is generally considered to be a most intractable cause of deafness.

The nasal congestion which is such a feature in the oestrous cycle of the higher primates has to a very large extent been lost in human phylogenetic development. None the less, it seems that the majority of women have some degree of nasal turgescence during menstruation and pregnancy. The bleeding of "vicarious menstruation" has been observed to come not from Kiesselbach's septal triangle, as is usually the case, but from the congested middle and inferior turbinates (Mortimer *et al.*, 1936b).

Many women complain that their noses are "stuffed up" or "run" immediately before or during their periods. In an unlucky few the turgescence may give rise to even more severe symptoms. In some women the nasal congestion may result in an attack of vasomotor rhinorrhoea; this is not an allergic reaction, but an exaggeration of a normal physiological response. Why this should be so one cannot explain: cellular pathology is even less understood than cellular physiology. "The reactivity of the tissues . . . is an important factor in determining the effects of hormone secretion" (Levy Simpson, 1938).

This type of vasomotor rhinorrhoea which occurs in association with the menstrual function might be termed "oestrogenic rhinorrhoea"; but this does not mean to say that an allergic factor is necessarily excluded. It usually occurs regularly about two days before the onset of the menstrual period, during which an attack of asthma may develop. The asthma is often slow in termination because, as frequently happens, a catarrhal bronchitis of bacterial origin may supervene. The whole illness is likely to take some time to resolve, only to recur with the next menstrual cycle. As this syndrome often first appears in children of school age who are taking their higher examinations, the resultant disability is serious. The patients are seen for treatment usually on account of their asthma only; the preceding rhinorrhoea, which is much less spectacular and disabling than the asthma, is either disregarded or self-diagnosed as a "cold in the nose." If this self-diagnosis is accepted as such and the asthma treated symptomatically, then the general prognosis as regards future attacks of asthma is not hopeful. But a careful questioning will reveal the true nature of the "cold"—that is, typical vasomotor rhinorrhoea, with no malaise or fever—and the prognosis is then materially altered.

### Nasogenic Asthma

Asthma produced in this manner, by a nasal affection, is termed "nasogenic asthma," and its mechanism is reflex through the naso-pulmonary reflex arc. The control of bronchial calibre and the influence upon it of nasal stimulation has been studied with the bronchoscope in experimental animals and the reflex paths worked out

(Maxwell Ellis, 1938). The existence of a similar control and influence in human beings is largely inferential from clinical observation, but there is also a certain amount of experimental support (Myers, 1929). The nasal element as the cause of an attack of asthma is not necessarily very obvious; the asthma may be preceded simply by a few sneezes or trivial nasal irritation, or running from the nose or eyes, the latter being a reflex via the sphenopalatine ganglion. In doubtful cases, when the patient is seen at the beginning of an attack of asthma, one may help to establish the diagnosis by spraying the interior of the nose with 2 per cent. cocaine solution, which may abort the attack by interrupting the naso-pulmonary reflex arc.

The simplest and most effective means of maintaining an interruption in the naso-pulmonary reflex arc is by the method of intranasal zinc ionization; this acts in much the same way as does the diagnostic cocaine spray. It is a non-specific method of rendering the nasal mucous membrane less sensitive to whatever may happen to be the sensitizing agents, and thus of interrupting unduly sensitive reflex arcs. The rationale and technique of intranasal zinc ionization has been dealt with fully and adequately by Shields (1936, 1937). He points out that the technique literally is an *intra*nasal one, and that there are many possible sources of error. In some cases the sensitive areas may be high up in the nose and not entirely accessible by the ordinary gauze-packing technique. Ionization may then be carried out by continuous irrigation, as described by Shields (1937). Naturally it is essential to look for and attend to nasal or dental sepsis, or other well-recognized factors in the causation of asthma. In many cases also there may be easily detectable factors such as pollen or food susceptibility (Kennedy, 1936; Maxwell, 1936). Vasomotor rhinorrhoea is the outward sign of many possible inward disturbances, the nose being as it were a common denominator or "final common path."

## Two Illustrative Cases

The following are two illustrative cases of menstrual asthma preceded by vasomotor rhinorrhoea which were sent to me as cases of simple asthma and which had previously been treated as such. It was decided to treat the apparent nasal origin of the asthma by the method of intranasal zinc ionization on the ground that it is effective in other cases of asthma caused by vasomotor rhinorrhoea, whether the latter is seasonal (hay-fever) or non-seasonal.

### CASE I

A girl aged 14 was sent to see me on November 12, 1937. She was apparently normal physically, including the nasal mucosa. She had had a severe attack of asthma during her first period, and again with her second and third. Questioning elicited the fact that she had had a "cold" two days before each period, and further questioning made it obvious that the so-called cold was an attack of vasomotor rhinorrhoea. A first treatment by intranasal zinc ionization was given. She was seen again on November 19, and was menstruating, the period having come on a week earlier than was anticipated. She had had an attack of sneezing, with slight rhinorrhoea, on November 16, and the period had begun the following day, but there was no asthma. She was given second and third treatments on November 26 and December 10. The mother reported on January 3, 1938, that the girl had had no further symptoms. She again reported on May 20 that the patient was continuing well, and "had not had to stay away from school," but that there had been an insignificant running from the nose premenstrually. This latter observation may be taken as reassuring from the point of view of the effects of the treatment, as it indicates that the nasal erectile tissue has not been destroyed and has not lost its capacity for responding to circulating oestrogenic hormones. If the mucosa returns to its previous more than normal responsiveness, then the treatment can be repeated. But this no more detracts from the value of the treatment as a method of controlling symptoms than does the necessity for repetition of injections in diabetes or pernicious anaemia.

### CASE II

This is a rather more complex case, there being obvious dietary factors as well. A girl aged 16 was first seen by me on April 7, 1937. She had had asthma, preceded by "running colds," for two years since she had come to live by the sea. Inland she was well, except on one or two occasions. As a child she used to have severe urticaria after eating eggs or chocolate: when seen by me she was "upset" by milk and eggs during the attacks of asthma, but not in between. Her history showed that her asthma coincided with her periods and was preceded by vasomotor rhinorrhoea. On physical examination she was found to be normal with the exception of the turbinates, which were of a pale blue colour. The irregular rhythm of her asthma and the history of food susceptibility showed that there was more than one (oestrogenic) factor, but as the nose was the "final common path," and as she had had the usual treatment for asthma, it was decided to treat the nose. After a course of treatment by intranasal zinc ionization she had no more rhinorrhoea and consequently no more asthma. When last heard of, on May 31, 1938, she was still well.

One cannot disregard the possibility that this form of vasomotor rhinorrhoea, with or without asthma, may have some psychological basis, associated as it is with sexual manifestations. But in Case I the vasomotor rhinorrhoea *preceded* the patient's first period, the onset of which she obviously could not have anticipated. Further, in the two cases quoted the patients considered their "colds" as of no great inconvenience or disability; it is a universally recognized principle in psychology that the significance of a psychological symptom is in direct proportion to its value to the patient, and therefore this cannot be great if the owner of the symptom treats it as of not much importance.

I am greatly indebted to Professor Sir Walter Langdon-Brown and Professor Samson Wright for help and advice in the preparing of this communication and in the tracing of references.

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The Autumn Exhibition of the Royal Institute of British Architects is to deal with the subject of the ordinary small house. It is to be opened jointly by Miss Ellen Wilkinson, M.P., and Mr. J. B. Priestley on Thursday, October 13. The object of the exhibition is to show ways in which the architects think the small house, provided for people of moderate means, might be improved. The exhibition will be open to the public, admission free, from October 14 to 29 at the R.I.B.A., 66, Portland Place, London, W.1. It will then, like all R.I.B.A. exhibitions, go on a tour of provincial centres and London suburbs for a period of two years.

# Clinical Memoranda

## Parental Whole Blood in the Prophylaxis of Measles

Reference to the literature shows that of the methods at present available for the prophylaxis of measles the injection of whole adult blood has been much less often employed than the alternatives: (*a*) convalescent serum, (*b*) pooled adult serum, (*c*) immune globulin prepared from placental extracts. This fact is greatly to be deprecated, because the use of parental blood at once commends itself as the most generally applicable, useful, convenient, and inexpensive method. The vast majority of cases in this country are treated at home by their family doctors, and for employment in these circumstances alternatives (*a*) and (*b*) are rarely available, while (*c*) is impracticable in most instances owing to its cost, and is not unlikely to meet with aesthetic objection from parents who may inquire into its source.

On the advice of the local medical officer of health, it was decided during an epidemic period, January to March, 1938, to adopt as a prophylactic method the injection of parents' whole blood into susceptible child contacts in the respective families, with a view to modifying the attack and avoiding complications in the secondary cases without sacrificing the permanent immunity to be derived from the attack. In domiciliary practice this is the obvious aim rather than complete prevention, which for various reasons may be greatly desired when measles is introduced to the children's ward of a hospital or into an institution. This method is particularly suitable to private medical practice, and affords an excellent opportunity for practitioners to make a real contribution to preventive medicine—an opportunity which should be seized before local authorities under pressure of public opinion are impelled to undertake measles prophylaxis during an epidemic.

### Treatment

A series of twenty contacts were treated by injections of parental blood. The average quantity given was 10 c.cm., which would be considered too little by most workers. A comparison of symptoms and signs both in these twenty secondary cases and in the eighteen original cases, which were familial, was made in detail. Contact was intimate in all cases, and the primary cases could therefore be taken to represent as nearly as possible a series of eighteen controls. The difficulties in the way of collecting a large series of cases appear obvious, but if the method were widely adopted valuable data would soon accumulate. The results in the present series were so gratifying that it is earnestly hoped that others will work on similar lines and publish theirs. The method is simplicity itself, the blood being withdrawn, with the usual precautions, from the father's (or mother's) arm and injected intramuscularly into the child's buttock. In no case was permission refused to carry out this procedure when the principle of the method was made clear; in fact the parents were delighted to co-operate in the treatment and were entirely satisfied with the results. In no case was there the slightest reaction to the injection, which caused little inconvenience. The use of parental blood, given intramuscularly, obviates the necessity for any special examination of it except in the case of parents suspected to be suffering from communicable disease, and eliminates reactions.

The epidemic was a mild one, the primary cases occurring chiefly among children 5 to 7 years old attending various schools in Stretford. It is therefore considered that the infection in the control cases was fairly uniform; clinically the attacks certainly were, and it is felt that the primary cases may be compared to the treated cases, though, strictly speaking, they are not scientifically comparable in every respect. Such factors as time and intensity of infection are so uncertain as to render it impossible to obtain absolutely parallel control cases. Only one child contact in the practice was not treated by this method, and this child developed bronchopneumonia, from which she recovered. There were no complications either in the twenty controls (or untreated cases) or in the twenty treated cases. This was presumably due to the mildness of the epidemic.

The difficulty of estimating the exact day of exposure, and consequently the period after infection at which the blood was given, is obvious. Assuming that the rash shows on the fourth day after onset, it seems desirable to give the blood on the day following the appearance of the rash in the primary case.

In the present series the injections were given in six cases on the fifth day after first exposure (counting the day of the rash in primary cases as the fourth day of exposure of contacts); on the sixth day in four cases, on the seventh day in eight cases, and on the tenth day in two cases.

The amount of parent's blood injected was in two cases 5 c.cm., in one case 7 c.cm., in eleven cases 10 c.cm., in one case 12 c.cm., in two cases 15 c.cm., and in three cases 20 c.cm. It is considered that 20 c.cm. of blood is a reasonable quantity to inject if circumstances permit.

### Results

Of the twenty contacts treated, four were completely protected, fourteen developed modified measles, and two were unaffected. One of the four who failed to develop measles was a boy aged 12, who may possibly have already acquired immunity, though there was no history of a previous attack. The two "failures" were: (1) a child of 12 who received only 5 c.cm. of mother's blood, a totally inadequate quantity; and (2) a child aged 8 months who was teething and already had bronchitis before his measles began—he received 10 c.cm. on the seventh day after exposure. The youngest patient, a baby of 3 months, gave one of the best results.

It is of interest to note that in two cases the parents were positive that they had never had measles, in one of these being supported by the contention of the grandmother. In two other cases the parents were doubtful as to their own history in relation to measles. As the results in these cases were good it may be supposed that a subclinical or undetected or undiagnosed attack had conferred immunity on the parents. In sixteen cases the blood was taken from parents with a definite history of measles in early life.

The eighteen primary cases were typical unmodified attacks of uncomplicated measles, with lacrimation, cough, rash, increased temperature and pulse, and bronchial catarrh. The fourteen contacts who developed modified attacks showed definitely less severe symptoms than the primary cases. Bronchial catarrh was entirely absent in every case, lacrimation appeared in only five cases, temperature and pulse were raised in nine cases, and slight cough was present in eleven cases. The rash in all fourteen cases was distinctly modified; in several cases only a few discrete blotches were discernible.

My thanks are due to Dr. A. W. Davison of Stretford for permission to publish this series of cases, and to Dr. E. H. Walker, medical officer of health for the borough of Stretford, for helpful guidance and advice on the public health aspects of the subject.

Manchester. T. D. Culbert, M.B., Ch.B.

The population of Japan in October, 1937, was 71,252,800. Of the 50,000 medical practitioners in Japan 2,000 are women, who were all educated at the Tokyo medical school founded in 1920. Only about ten possess the degree of doctor of medicine, which was first granted them in 1929.

# Reviews

## THE CHRONIC RHEUMATIC DISEASES

*Chronic Rheumatic Diseases.* Being the fourth annual report of the British Committee on Chronic Rheumatic Diseases, appointed by the Royal College of Physicians. Number Four. Edited by C. W. Buckley, M.D., F.R.C.P. (Pp. 160; illustrations; 5 plates. 10s. 6d. net.) London: H. K. Lewis and Co. 1938.

We welcome the fourth annual report of the British Committee on Chronic Rheumatic Diseases, which incidentally will be the last in its present form, since it has been decided to continue the reports in a biennial journal under the same editorship.

The present volume opens with a plea by Professor Stanley Davidson for Governmental organization to cope with the problem of chronic rheumatic disease, since in his view it is too big to be tackled by the voluntary hospitals of the country. Professor Hench gives us another review of the year's work in America. Gout is becoming more widely recognized, and even fibrositis, hitherto not held in much regard in the United States, is coming into its own. Hyperthermal treatment of gonorrhoeal rheumatism is proving more and more useful. Rheumatoid arthritis is still the centre of interest, if only because it is so very difficult to be definite about it. The magnitude of the problem—3,000,000 sufferers from arthritis—is at last beginning to stir the imagination of the American people.

Three chapters on sciatica are interesting chiefly because they show how the specialist tends to view a disease syndrome through his own tinted spectacles. The neurologist thinks only in terms of interstitial neuritis, the orthopaedist only in terms of strains, unbalance, and faulty posture involving muscles, ligaments, and joints. Dr. Kersley's chapter is the best as taking the most comprehensive view, but even he is inclined to be led away into the displaced nucleus pulposus, a clever invention of the surgeon to justify laminectomy, though it is difficult to see how constant pressure on a nerve fibre can help leading to early atrophy, and so a rapid cure of the symptom of pain by degeneration of the pain fibres. Sciatica will be better treated when patient and doctor are prepared to submit to those very difficult disciplines, patience and rest.

Mr. Mitchell contributes an interesting chapter on rheumatism in the horse, reminding us that we may learn much from comparative pathology. A note by Dr. Kersley on bone drilling in arthritis suggests that this is only likely to be useful in osteo-arthritis, and that further experience is necessary before it can be recommended. Thorium X as an example of radio-active substances has proved to be of no use in acute stages, but may be useful in the late chronic stages of rheumatoid cases. The evidence of virus infection in rheumatism is reviewed, but no conclusion can yet be reached. An interesting critical review of vaccine treatment is given by Dr. Warren. He concludes that vaccine therapy is valueless in acute rheumatic fever. In rheumatoid arthritis large doses are no use but small doses may be helpful: further work with adequate controls is needed. There is no evidence that vaccine therapy is of any use in osteo-arthritis. Observations on the platelet counts during gold therapy are described, showing how easily these may reach a dangerously low level. At the St. John Clinic sixty cases divided into three groups were given large doses of gold, small doses of gold, and sterile oil as a control respectively. The first group showed the best clinical results, but there were considerable toxic effects, means to avoid which must be discovered. Finally, Sir Leonard Hill describes the physiological action of some methods of physical treatment, showing how unfounded are some of the claims advanced, but also how useful some of these treatments may be.

All the contributions to this volume are interesting and valuable, but when published between stiff covers it may be that some readers will be inclined to regard them as more authoritative and final than they actually profess to be. Hence we commend the wisdom of the editorial committee in deciding to publish the essays in future as a journal. We wish this journal all success, and believe that it will be as valuable as the four annual volumes that have preceded it.

## ANATOMY OF THE LIVING SUBJECT

*Surface and Radiological Anatomy for Students and General Practitioners.* By Arthur B. Appleton, M.A., M.D., William J. Hamilton, M.D., B.Ch., D.Sc., F.R.S.E., and Ivan C. C. Tchaperoff, M.A., M.D., B.Ch. D.M.R.E. (Pp. 311; 338 figures, including many in colour. 15s. net.) Cambridge: W. Heffer and Sons. 1938.

The authors of this book have reached out beyond the bounds of the descriptive anatomy of the dead "to the study of features that are accessible to examination in the living subject," which have become available by radiographic and other modern methods. They have attempted to fill a definite field and to bridge the gap in certain regions between the anatomy of the dissecting room and that of the living subject that has existed too long. There is a strong clinical flavour to this book—an obvious attempt to bring anatomy into closer association with the work of the clinician. The authors show how percussion, auscultation, the use of the laryngoscope, bronchoscope, gastroscope, and other instruments of clinical medicine may be employed to great advantage on fellow-students in the routine work of an anatomy department. The course of the nerves may be marked out by electrical stimulation, a method that can be employed also in the analysis of muscle action. In short, wherever possible, the authors have turned aside from the cadaver to the study of the living subject.

Concise orderliness is observed, descriptions are brief but adequate, and clearly the authors have restrained each other, with results that have made it possible to convey a vast amount of information in a volume of only 300 pages. It would, however, have been an advantage if references had been given, especially when it was obviously impossible for a subject to be adequately dealt with or receive more than passing mention. Throughout, the work is profusely illustrated by carefully selected radiographs, drawings, some of them in colour, and diagrams. Particularly successful are the photographs of various parts of the surface anatomy with parallel drawings of the underlying muscles, showing very clearly the nature and cause of the surface markings. We should imagine that artists would find these illustrations of great value, if indeed there are artists in these days who wish to represent what we ordinary mortals believe that we see. The standard of the reproduction of the radiographs is noteworthy, particularly in a volume that is turned out at so low a price.

The introductory section covers a wide range of subjects that are dealt with briefly, but on the whole satisfactorily. It is packed with useful information, much of which, though not definitely anatomical, is of interest and importance in the study of anatomy. We read of the possible variations that make the human being an individual and not a standard production. This aspect is stressed in a way that we have not noted in most works

on anatomy. Emphasis is laid on the group action of muscles and on their co-ordinated and antagonistic action—anatomy slides off into physiology. A brief outline is also included of all that it is necessary for the student to know of *x* rays in order to understand something of radiographic interpretation. A slight error is made when the authors state that "*x* rays are not perceived by the eye." *X* rays do affect the retina, but it was only the very early workers who tested this. To-day he would be a foolish person who subjected his eyes to a sufficient intensity of radiation to make this observation, which was at one time common knowledge. Nowadays protective measures are so adequate that practically no radiation comes to the observer.

The book is not divided into chapters but into sections that cover the usual subdivisions of "parts" that are dealt with in the dissecting room. Each section opens with a detailed description of the surface anatomy and works inwards towards the skeletal structures—the arrangement of the material is orderly and logical. In the past many have found difficulty in correlating the knowledge they acquired in the dissecting room with the conditions they met with in clinical medicine. To-day new methods are applied in the teaching of anatomy, and every attempt is made to "make the dead bones live." This volume, used in conjunction with the standard textbooks, will be of great assistance to students, and will appeal to all who have not had the advantage of learning their anatomy in schools where radiology and other accessory methods are employed.

## HERNIA

*Hernia: Anatomy, Etiology, Symptoms, Diagnosis, Differential Diagnosis, Prognosis and the Operative and Injection Treatment.* By Leigh F. Watson, M.D. Second edition. (Pp. 591; 281 figures. 31s. 6d. net.) London: Henry Kimpton. 1938.

Dr. Leigh Watson tells us in the preface to a second edition of his book that the revision has been necessitated by the adoption by many surgeons of the treatment of hernia by injection, a procedure of the value of which he is convinced. In the fourteen years which have elapsed, however, since the first edition appeared there have been other changes in outlook and practice, and the work has been brought up to date to conform with these. The author states that at the present time the generally accepted cause of inguinal and femoral hernia is a preformed or congenital sac. We doubt, however, whether this would be conceded by many in regard to femoral hernia, but to support his contention he says that R. W. Murray made post-mortem examinations on 100 subjects who had no hernia during life and found twenty-one potential or empty sacs, all of which with one exception were of the femoral variety.

Each chapter is followed by a short bibliography, and a future edition would be improved by an index of authors in addition to the general index. No fewer than eight chapters of this edition are devoted to the injection treatment, which is considered in much detail. The work is well illustrated throughout. Dr. Watson apparently has not much faith in the inguinal sphincter, because even in children he reinforces the inguinal canal by a Bassini type of operation. Many who believe that even in young healthy adults suturing of the conjoined tendon destroys the action of the sphincter and that removal of the sac is all that is necessary or desirable would not be in agreement with him here. The rarer forms of hernia, such as sciatic, pudendal, and hernia through Petit's triangle are described and illustrated, and there is a good account of intraperitoneal herniae. Left duodenal, as pointed out by Lord Moynihan, is apparently commoner than right duodenal herniation and takes place into the paraduodenal fossa of Landzert, while right herniation occurs into the fossa of Waldeyer.

This continues to be a comprehensive and valuable work of reference, and, although the final chapter on medico-legal aspects will be chiefly of value to American surgeons, it contains much that will interest the reader in this country.

## CLINICAL LECTURES ON PSYCHO-ANALYSIS

*Clinical Aspects of Psycho-analysis.* By Dr. René Laforgue. Translated from the French by Joan Hall. The International Psycho-analytical Library, edited by Ernest Jones. No. 31. (Pp. 300. 15s. net.) London: Hogarth Press. 1938.

This book consists of fourteen clinical lectures delivered to students of psycho-analysis. As such it cannot be and is not a systematic textbook for the beginner. But for those already acquainted with the teachings of the psycho-analytic school it contains many interesting discussions of difficult problems illustrated by case histories. There are chapters on the cure and completion of treatment illustrating the unwillingness of some patients to admit that they are cured and do not need to continue their visits to the analyst indefinitely. Again, on "active" treatment and the necessity to stimulate a desire to be cured the author is informative and interesting. In a chapter on the family neurosis he describes how neurotic parents may inevitably implant neuroses in their children and how these children react to the family situation. Finally the limitations of analytic treatment are discussed, and it is pointed out that the lives of some patients may be so utterly dependent on their illness, which serves them as a necessary protection or as a means of self-punishment for an overwhelming sense of guilt, that existence is insupportable without it. It is wiser, in the author's opinion, to leave such people alone.

The book has been well translated by Joan Hall, and is to be recommended to all those who are interested in mental mechanisms as interpreted by the pupils of Freud.

## THE BROMPTON REPORTS

*Brompton Hospital Reports.* A collection of papers recently published from the Hospital. Volume VI. 1937. (Pp. 183; illustrated. 2s. 6d., postage 6d.) London: Research Department, Brompton Hospital.

Most of the papers contained in the sixth volume of these reports have already been published elsewhere by present or past members of the staff of the Brompton Hospital. To the following two papers special attention may be drawn. In "Pulmonary Tuberculosis in Young Adults: Significance of Contact History" W. E. Lloyd and Margaret Macpherson conclude that contact is an important factor in the aetiology of pulmonary tuberculosis in young adults and therefore that it should be possible to detect the disease in its early stages in many instances by examination of all those with a history of such contact. But the evidence they produce is, in the reviewer's opinion, not sufficient for concluding that it "stresses the value of continuing the observation of contacts for at least five years after they were known to be last exposed to infection." In "Chronic Diffuse Bronchopneumonia" J. G. Scadding describes a condition which he believes may be a recognizable clinical entity. He has since published further papers on this subject.

Three papers contained in this volume have not previously been published. F. H. Young and N. C. Oswald give an account of eleven cases of multiple cystic disease

of the lung. R. H. R. Besley gives a short study of the relationship of post-lobectomy atelectasis to bronchography, and W. D. W. Brooks and F. P. Lee Lander write on senile phthisis, the article being based on 364 cases, admitted between 1929 and 1935 to the Brompton Hospital, in which pulmonary tuberculosis apparently first produced symptoms after the patient had attained the age of fifty.

The volume concludes with the usual statistical hospital tables. The total number of thoracoplasties performed (a thoracoplasty in more than one stage is reckoned as the same number of operations) was 297. No fewer than forty-five lobectomies and ten pneumonectomies were carried out; and thirty-two operations for lung abscess. In the report of the pathological department we note with some surprise that, although a total of 1,064 examinations of the sputum for tubercle bacilli were carried out, there were only thirty-three examinations by concentration methods and only sixteen by culture. There is no record of examination of the gastric contents for tubercle bacilli.

## Notes on Books

The third edition of E. T. Bell's *Textbook of Pathology* (Henry Kimpton, 42s.) is larger than its predecessor by more than a hundred pages and contains many new illustrations. This work excels in terseness of statement, which enables a full description to be given in a small compass. The teaching is sound throughout and the sections on cardiac, arterial, and renal disease, which embody the statistical and other fruits of the author's own extensive studies, are particularly valuable. The arrangement is conventional, except that silicosis figures as a disturbance of pigment metabolism and deficiency diseases receive no separate consideration (in some cases none at all). Much recent work finds brief mention, but there is little discussion of controversial matters—perhaps a wise policy in a work intended primarily for the student.

Twelve teachers from medical schools in the Southern States of the U.S.A. have collaborated in writing Kracke's *Textbook of Clinical Pathology* (Baillière, Tindall and Cox, 27s.). This form of authorship, though suited to advanced treatises, is apt to lead in a textbook to lack of co-ordination. Of this there is evidence here both in repetition and omission: the chapter on the examination of faeces, for instance, is devoted almost exclusively to protozoa and parasites, and does not describe the test for occult blood or methods of bacterial cultivation. Methods of bacteriological diagnosis also receive scant attention in the chapters on urine and cerebrospinal fluid, and in that on sputum they are described only for the tubercle bacillus and the pneumococcus. Nearly half the book is devoted to methods of examining blood, and other subjects treated fully are the laboratory diagnosis of pregnancy, syphilis, and rabies. Most books such as this have their useful points in the form of new practical details or better illustrations, and with the latter this one is lavishly supplied. Most such books, and this is no exception, fail to cover so wide a field completely, and their practical use needs to be supplemented by reference to works on the individual branches of pathology whose application to diagnosis they describe.

In the section of Dr. Jurgens's symposium on rheumatism dealing with Bechterew's disease (*Die Bechterewsche Krankheit*) known to us as spondylitis ankylopoietica, Dr. Walter Krebs considers that there is a primary weakness of the mesoderm, but that an infection entering by teeth or tonsils forms a metastatic focus which is responsible for the actual syndrome, and that this is not influenced by subsequent treatment of the portals of entry. Occupation involving strain to the back may determine the incidence of the disease in a large number of cases. So far as diagnosis and treatment is concerned there is nothing particularly original, a survey of the usual methods being given. Dr. Wurm contributes a section on the pathological appearances in this disease. The book is published at Dresden and Leipzig by Theodor Steinkopff at RM.6.

## Preparations and Appliances

### HYSTERO-SALPINGOGRAPHY WITH A SELF-RETAINING INSTRUMENT

Dr. Edward Elkan (London, W.1) writes:

The number of instruments invented for the performance of Rubin's test suggests that there is still room for improvement in their construction. The disadvantages of the available instruments are these:

The cone of the cannula has to be pressed firmly against the cervix, but where a spring is employed strong enough to prevent the reflux of the oil the procedure becomes too painful to be carried out without the aid of an anaesthetic. Where no spring is employed sufficient pressure cannot be exerted to prevent the reflux of most of the injection into the vagina. The cone itself, when round, does not fit well into the split external os of a multipara. A cone with an oval cross-section would not fit a nullipara. Different cones are needed for both types of cases. The length of the uterine end of the cannula from the top of the cone to the end of the instrument is, in these instruments, unchangeable. The actual length of the cervical canal, however, plus the length of the cavum uteri is not the same in any two patients. The position of the cone on the cannula therefore should be made changeable, for it is important that the instrument should pass the internal os but not get in touch with the opposite wall of the cavum uteri. Where the cannula has a hole at the very end this can easily get obstructed. These holes should always be situated at the side of the tip of the cannula. To prevent the reflux of air in Rubin's test or that of oil in a salpingography, a vulsella is usually fixed to one side of the cervix. One vulsella can only exert an unequal pressure and cannot prevent the injection from escaping along the other side of the cervical canal. Furthermore, with an arrangement of this kind the oil can flow back freely as soon as the surgeon releases his hold on the instruments. If after an interval, during which the first radiographs are developed and viewed, the surgeon wishes to make a further injection, he will find the uterine cavity empty and the cannula out of position.

The instrument shown in Fig. 1 was evolved with the shortcomings of the available cannulas in mind. It has proved

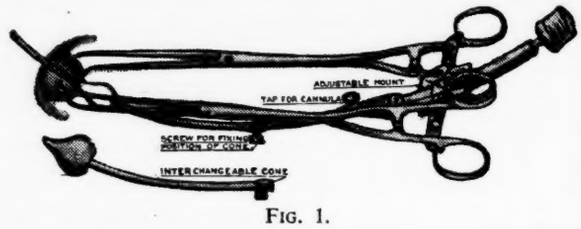


Fig. 1.

useful to me and others and does not, at present, seem to need further improvement.

No spring is employed. The cervix is pressed against the cone by two vulsella forceps which are hooked on to the distal end of the cannula by means of an adaptable mount which carries the hooks. Each side is adaptable independently of the other. Two cones of different shape are supplied. They are interchangeable according to the shape of the cervix. The cone can be fixed anywhere on the cannula and the length of

the uterine end of the instrument is thus adaptable according to the length of the cervical canal and cavum uteri. The cannula is closed and blunt at the tip, the holes being situated a short distance from the end at the side of the instrument.

For the performance of either insufflation or salpingography the patient needs no preparation nor—with very rare exceptions—an anaesthetic. If an electric headlamp and a self-retaining vaginal speculum are employed the gynaecological

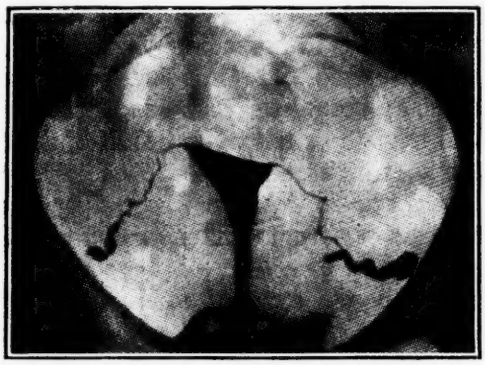

FIG. 2.—Case 2972. Tube and ampulla well filled on both sides.

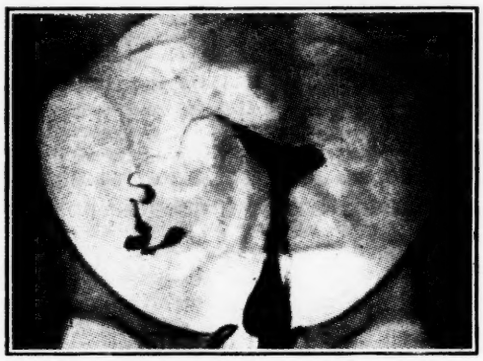

FIG. 3.—Case 3107. Right tube normal; left tube blocked.

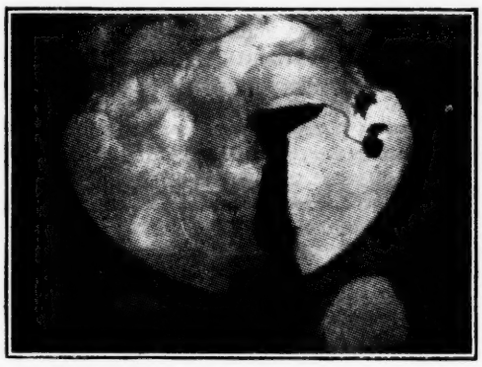

FIG. 4.—Case 3373. Right tube blocked. Oil escaping from abdominal os of left tube in small droplets.

part of the operation can be done without assistance. The steps of the procedure then are the following:

Exposure of external os uteri with self-retaining speculum.
Choice of cone according to the shape of the cervix.
Insertion of vulsellum on right side of cervix.
Sounding of width, depth, and direction of cervical canal and cavum uteri.
Adjusting uterine end of cannula according to these findings.
Insertion of second vulsellum opposite to first.
Insertion of cannula.
Passing the loops of both vulsella off the hooks of the slider.
Adjusting the position of the slider on both sides so that sufficient pressure is maintained.
Removing vaginal speculum.
Supporting cannula and vulsella forceps with sandbags.

All this is done in a few minutes. We have now inserted a self-retaining uterine cannula which cannot change its position even if it is not held in place by anybody. The pressure applied to the cervix is evenly distributed to both sides. If narrowness of the vagina makes manipulation with two vulsella forceps difficult, one can be used. In this case the pressure applied to the cervix is, however, unevenly distributed and the cannula is not as well balanced as might seem desirable.

The opposite wall of the cavum uteri can neither be touched nor injured as the length of the intra-uterine end of the cannula was specially adapted for the particular case. The vaginal speculum, which causes two-thirds of the discomfort to the patient, is no longer needed after the cannula is in position, and can be removed. The presence of the remaining instruments is hardly felt by the patient, who can now slide back into any position suitable for the taking of the radiographs.

The patient can easily be screened while the opaque oil is injected, and the most suitable moment for the taking of the films can in this way be chosen. The oily base of the injection should not be too viscid. I find neo-hydriol more comfortable to inject than lipiodol, which, even if heated to body temperature, maintains a higher degree of viscosity. After the first one or two radiographs have been taken the tap of the cannula is closed and the syringe temporarily disconnected. The self-retaining instrument needs no further attention, and the patient can be left in the care of the nurse until the films have been viewed and a decision has been made as to the need of further pictures. Should these be found necessary more oil can be injected without delay; the patient experiences no discomfort through repeated adjustments and manipulations. After the last radiographs have been taken the instruments can be removed without reinsertion of the vaginal speculum. The patient all the time remains in the supine position.

I have to thank Dr. J. V. Sparks for his kind permission to publish these radiographs produced with the aid of the new instrument. The instrument itself was made for me by John Bell and Croyden, Wigmore Street, W.1.

## HEPARIN

We have received samples of this physiological anticoagulant prepared for clinical use, both from British Drug Houses Ltd. and from Roche Products Ltd. The substance is prepared from liver, and its activity is measured biologically. The unit is the quantity required to prevent coagulation of 1 c.cm. of blood, and the purified products contain 400–500 units per miligramme. Heparin is the most reliable anticoagulant to employ when taking blood samples, and it is probably superior to other anticoagulants for use in blood transfusions. Various workers have also reported favourably on the use of heparin in the prevention and the checking of the progress of venous thrombosis. The preparations have, therefore, a wide field of clinical use. British Drug Houses Ltd. supply sterile tubes for collection of blood which contain sufficient heparin to prevent coagulation. These will be a great convenience to practitioners.

## ADRENALINE PREPARATION FOR ASTHMA

Vaporole solution of adrenaline (1 per cent.), issued by Burroughs Wellcome and Co., is intended for the symptomatic treatment of mild to moderate attacks of asthma. Graeser and Rowe (1935) showed that oral inhalation of a 1 in 100 solution of adrenaline produced in many cases a more rapid effect than did hypodermic injection of a 1 in 1,000 solution. The value of a technique which spares patients the inconvenience of hypodermic injections is obvious. In view of the potent action of adrenaline it is obviously important that the vaporole solution should not be confused with the usual 1 in 1,000 solution used for hypodermic injection. The bottles of vaporole solution and their containers are labelled "Caution—Not for injection," but we would suggest the advantage of making this warning somewhat more prominent.

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## THE PROFESSION AND THE EMERGENCY

Once again—and within twenty-five years—the members of the medical profession have had to share with all thoughtful fellow-citizens the anxiety of a worsening international situation and a menace of general European war. This time the black clouds have been longer gathering and the efforts to dispel them more protracted and persistent. With the causes of the crisis medical men and women as such are not directly concerned, save to deplore racial animosities that lie at the root of the trouble and to recognize some of the psychological factors in the background of political movements. Medicine knows no frontiers; so far from bearing any responsibility for international strife the medical profession has worked for harmony and appeasement between nations as between individuals. During these past weeks and days of growing apprehension doctors have gone about their daily tasks and steadied the nerve of others. If crisis should lead to catastrophe—and at the time of writing the issue of peace or war is still in the balance—they will continue at their accustomed duties, adding others to these as the national need demands. Their response to the call may be taken for granted, and those who have best prepared themselves beforehand will be of most service to the State. The British Medical Association long since co-operated with the Government in preparing a classified index of the members of the profession, for use in case of national emergency. The experience of 1914-19 proved that the medical profession can be trusted to organize itself efficiently in time of trial by machinery which interlocks with that of public administration both civil and military.

Let us hope and pray that medicine will not now have to mobilize for war; but the time has certainly come for bringing into action a strong and representative co-ordinating committee to give advice to the Ministry of Health and other Government Departments on the professional aspects of problems that would immediately arise if the worst happened. Among other questions that each individual doctor will ask is: "Where am I to go, and what am I expected to do in such and such circumstances?" The Central Emergency Committee, which was appointed by the British Medical Association at the behest of the Ministry of Health, already has definite functions. It has prepared a voluntary national register of medical practitioners. It has been given the enormous task of advising the Government on the allocation and distribution of medical personnel. In this way round pegs will go into round holes. But that is not enough. There is need for a representative medical body which will undertake the larger task of advising the central and local authorities on the medical aspects of the many and complex problems that would immediately arise in the event of war. It needs little imagination to perceive that under present-day war conditions practical steps will have to be taken, on behalf of the civilian community, which cannot prove effective without expert guidance from those whose duty it will be to give their service to the bodies and minds of the public.

Immediately the state of emergency arises, the Central Emergency Committee, with additions, becomes a Central Medical War Committee. As such it will deal with medical man-power. It could be given further powers and responsibility and become a body of a wide advisory and consultative nature. The Head Office of the British Medical Association has already issued to the secretaries of its units throughout the country a model scheme for the protection of practices of absentee general practitioners and a plan for setting up Emergency Medical Committees in every area. These bodies, at need, would function immediately as Local Medical War Committees in direct co-operation with the Central Medical War Committee for the general provision and allocation of medical personnel to the Defence Forces and for meeting all civilian medical requirements in the event of hostilities. Meanwhile the Ministry of Health has issued an announcement on the immediate duty of doctors and nurses, which will be found at page 719, with other information about measures to meet emergency.

## ELECTRICAL INJURIES

The clinical and pathological pictures presented by cases of severe electrical injury are often so complicated that it has become imperative to reduce them, if possible, to their essentials from the point of view of the medical man faced with the problems of how to act in a given case. The characteristic electrical burn requires no special consideration other than that incident to the treatment of all severe burns. Much care is, however, necessary in deciding on a course of action in a case of apparent death from electrical shock, and for this some knowledge of the physiological and pathological effects of such shock is essential. In a recent publication Alexander[1] gives a critical review of the

[1] *J. Industr. Hyg.*, 1938, **20**, 191.

literature on the clinical and pathological aspects. The minimum fatal current for human beings is from 70 to 80 milliamperes. If contact is sufficiently good and the duration of the current long enough 25 volts may be fatal. The resistance of the human body varies from 50,000 to 218 ohms according to the perfection of contact, duration of current, etc. In legal electrocution the contact is so perfected and the flow of current is so prolonged that the manifestations are not comparable to those found in accidental electrocution, where the contact is short in time and usually imperfect. Animal experiments have contributed much important information on the pathology of electrocution. It is found that in animals currents of low tension and intensity kill by producing ventricular fibrillation—closing the current inhibits the heart; opening the current is followed by fibrillation—and currents of high tension and intensity kill by paralysing the bulbar respiratory centre. Direct experiment showed that cardiac inhibition is produced by electric shock (applied to the head) through stimulation of the vagus centre (cardio-inhibitory centre); cessation of the current is followed by a complete block at the vagus centre. Similar effects are demonstrable on the vasomotor centre; the current first produces a stimulation of the centre and then follows a temporary paralysis on cessation of the current—that is, intense vaso-constriction is followed by generalized vasodilatation, a state of affairs leading to stagnation of blood in the peripheral vessels on the venous side. The sequence of stimulation and later paralysis applies also to the respiratory centre. It was also found with animals that artificial respiration led to recovery in all cases in which no gross damage to the brain or spinal cord had been produced by heat effects.

Clinically, shock by currents of high amperage may produce unconsciousness for hours or days, beginning immediately after the shock; often there follows severe motor irritation (hyperkinesis or convulsions) associated with delirium and confusional states; the patient may be pallid or cyanosed; symptoms of raised intracranial pressure and cerebral oedema may supervene. It is not necessary for the production of these symptoms that the current shall have passed directly through the brain. Thus in a case in which the current passed from the right hand through the legs to the ground there was unconsciousness in a short time after the shock, and on recovery of consciousness there was vomiting, headache, monoplegia, and hyperaesthesia on the right side and the right disk was choked; the signs and symptoms cleared up in thirty-three days, and the neurologist in charge attributed the clinical picture to cerebral oedema. Permanent disturbance of the central nervous system is not common, and when it occurs the symptoms resemble those of multiple sclerosis. Phenomena such as hemi-choreo-athetosis, myoclonus of the face, oculomotor and vestibular disorders, retrograde amnesia, atypical Parkinsonism, pupillary disturbances have all been described after severe electric shock. On the pathological side the principal changes found in the brains of patients dying in the acute stage of electrical injury are oedema and small perivascular haemorrhages. Where the current has passed through the head (as in legal electrocution) definite changes are found in the ganglion cells. In a fatal case described by Kawamura (quoted by Alexander) a young man of 26 sustained an accidental shock (A.C. 48 cycles, 220 volts) from his left hand to his left foot. The sequence of events was: the patient was first paralysed, then cried for help, and slid to the floor on being freed from contact; the pulse slowed and respiration gradually ceased, urine being voided. Post-mortem examination forty-six hours later showed meningeal and cerebral hyperaemia, pulmonary oedema, hepatic and renal congestion, perivascular haemorrhages, and congestion of cortex, pons, and medulla, and the blood in some congested vessels was homogenized (? hyaline thrombus). The question in this and in other similar cases is how to regard the brain lesions. The view of Jellinek is supported by Alexander that these lesions are secondary to the circulatory and respiratory inhibition, and that death is due to internal suffocation.

Emphasis must be placed on the fact that death from electric shock is not immediate but delayed and slow; the paralysis of the vital medullary centres is not permanent, and provided efforts to supply these centres with oxygen are successful, there is every probability of recovery. Alexander cites the remarkable series of cases published by MacLachlan in which of 479 cases of severe electric shock 323 were successfully resuscitated by the application of artificial respiration in a short time after the accident. Here it must be remembered that artificial respiration must be carried on, if necessary, eight to twelve hours by shifts of trained men until either spontaneous respiration is established or livid patches and rigor mortis appear. The importance of this procedure cannot be too strongly stressed, since post-mortem examination has shown that persons have "lived" after the accident for periods much greater than has been suspected. Intracardial injection of atropine and adrenaline is a valuable aid, and if after recovery there is evidence of raised intracardial pressure lumbar puncture should be carried out and repeated if necessary.

## PROGRESS IN RADIUM THERAPY

The Annual Report of the Radium Institute for 1937, which has just been published, is the last which will appear under that title. The amalgamation of the Institute with the Mount Vernon Hospital has now been completed, and in future the work of the two institutions will be performed by a single body—the Radium Institute and Mount Vernon Hospital. During the past year research into radium beam therapy has been continued; in addition to providing accommodation for the two five-gramme units the Institute also supplies some of the necessary staff, maintains thirteen beds reserved for patients undergoing this form of treatment, and bears the cost of overhead charges. The importance of research into the treatment of cancer by massive units is great from the point both of exploring therapeutic possibilities and of investigating the best conditions of safe working for patients and operators. In the general medical part of the report, contributed by Dr. Roy Ward and Dr. Durden Smith, one of the questions considered is that of the possible invasion of the urinary bladder in cancer of the cervix uteri. Subsequent experience has confirmed the view expressed in 1935 that micturition symptoms and bimanual examination are insufficient and unreliable as affording evidence of involvement of the bladder. It was suggested then that gross vascular dilatation and petechiae shown by cystoscopy at the base of the bladder might be of prognostic significance. The suggestion was made on the ground that two patients with early cervical carcinoma in whom these signs were present died with extensive neoplastic infiltration of the bladder in the second year after treatment. Routine cystoscopic examinations of a further hundred cases have, however, demonstrated that no such special significance can be attached to these appearances. It had also been regarded as probable that when cystoscopy showed definite invasion of the bladder treatment should only be local and palliative; it is now considered advisable that the full treatment should be given. Recurrences after Wertheim's operation have shown that of eighty patients given radiation therapy between 1925 and 1932 ten survived five years and over; of the remainder twelve were untraced and one died from other causes. Since 1932 five more patients—of whom three are still alive—were treated either by vaginal irradiation alone or by vaginal irradiation combined with interstitial radium to a recurrent mass, carried out per vaginam. There is an interesting note on "pitch warts," which are common in those who work with gas-tar and the various oils derived from the destructive distillation of coal. With the exception of the scrotum, these warts occur on exposed parts of the body—the face, neck, scalp, forearms, and hands. Many workers, however, who have been employed in these industries for fifteen years or more show no signs of developing any such lesion. It is, nevertheless, evident that in many cases the process begins long before there are any clinical manifestations, since pitch warts are seen in patients who have discontinued working with coal-tar and its products for several months or even years. There are two main clinical types. The one is soft, villous, and easily bleeding; while the other, and commoner, type is hard, smooth, and rounded and can be detected on palpation before any lesion is visible. In their later stages they appear as conical warts with the superficial layers of the skin stretched over them, and ulceration, if it occurs, affects only the apex. Their importance lies in the fact that if neglected they are very likely to become carcinomatous. Fortunately, they are extremely radiosensitive: treatment is by unscreened radium plaques placed in contact with the wart for periods of from one hour and twenty minutes to one hour and forty minutes, and they nearly always disappear in from four to five weeks. Increased care by employers and improved education of workers have considerably diminished their frequency in recent years. The report includes an account of twenty-eight cases of limbal tumours—growths arising from the junction of the cornea and conjuctiva—most of which were squamous-celled epitheliomata. These were treated by unscreened radium plaques placed in contact with the growth, and no instance of cataract was recorded. In all but two cases, in which enucleation was subsequently performed, the results were completely satisfactory. It is to be hoped that these cases will be kept under careful observation, as they afford excellent material for observing any possible subsequent effects of radiation upon the retina. The statement is frequently repeated that nerve cells of all kinds are practically immune from injury by radiation, but recent investigations have shown marked histological changes. The Radium Institute has here a valuable series of cases treated under identical conditions in which periodical ophthalmic examination may give information of practical as well as of scientific interest.

## THE PRAGUE SERA REACTIONS FOR CANCER

Professor Heyrovsky has recently summarized[1] investigations carried out in the Charles University of Prague on the diagnosis of cancer by his polarographic method, a more detailed account of which was published earlier by Brdicka.[2] The method consists in measuring the direct current passing at increasing voltages through a fluid between electrodes of special type. The apparatus used records the current–voltage curve photographically. For the diagnostic test 0.2 c.cm., or even less of serum, is subjected to a short and simple chemical treatment and then examined by the polarograph. A positive reaction is shown by a characteristic change in the current–voltage curve. Brdicka reports tests on sera from 187 individuals. The polarographic diagnosis was correct in 113 out of 120 patients with malignant disease, while among thirty-eight normal sera only one gave a positive reaction. Nevertheless, the test is not specific for cancer since positive reactions are obtained in febrile and inflammatory conditions. Tests made in Copenhagen by Bergh, Henriques, and Shousboe[3] gave similar

[1] *Nature*, 1938, August 20, 317.
[2] *Act. Unio Internat. Canc.*, 1938, 1, 13.
[3] *Nature*, 1938, April 23, 751.

results, though positive reactions were recorded for patients with hepatic disorders. The Danish workers state that the difference between non-cancer and cancer sera is unquestionable, but they are not yet prepared to assess the diagnostic value of the reactions or to decide what constituent of serum is responsible for them.[4] Brdicka ascribes them to an increase in protein cleavage products due to the abnormal proteolysis of albumins. Investigations are in progress to determine whether the cleavage products are the same in cancer patients as in febrile patients; if not, an important refinement of the test will be possible. Some indications that the reactions vary quantitatively with the stage of cancer development are also under examination. Diagnostic tests for cancer have a poor record. Dr. P. N. Panton[5] reported unfavourably on several and found an important cause of exaggerated claims in the inadequacy of clinical control. But, as he says, the problems of early diagnosis and treatment are so important that claims to solve them cannot be rejected out of hand because the underlying theories are improbable. It is reasonable, therefore, to withhold judgment on the Prague reactions but to admit that they deserve rigorously controlled investigation. They have received a measure of independent confirmation which seems to justify the claim that the results are perfectly reproducible, and it is noteworthy that the chemical treatment is simple and that the reactions are registered automatically. Thus there are grounds for hope that this test, unlike some others, will not be dependent on the meticulous performance of ill-defined but involved technical procedures nor upon uncommon skill and ingenuity on the part of the investigator.

## A CONVENTION ON OPIUM PRODUCTION

The Advisory Committee of the League of Nations has now formulated, and submitted to the Governments concerned for their observations, the main principles on which a new opium convention might be based. The objectives defined are (1) to suppress the abuse of narcotic drugs, (2) to supplement the Hague Convention of 1912, the Geneva Convention of 1925, and the Narcotics Limitation Convention of 1931. To these ends the production of raw opium is to be limited to recognized world requirements, and a definite quantitative limit is to be fixed annually. An international controlling authority is to allocate to each country, on the basis of estimates furnished by them, the quantities annually to be produced, exported, or imported, as the case may be. Stocks of raw opium are to be regulated alike in producing and in consuming countries. National control will also have to be provided for in harmony with the international scheme. The substances to be covered by the future convention on production are:—(*a*) Subject to limitation: (1) poppy cultivated for the production of raw opium; (2) raw opium. (*b*) Subject to certain measures of control: (1) poppy plant, if and when used as raw material for extraction of opium alkaloids; (2) opium poppy cultivated for other purposes. The amount to which production of raw opium is to be limited is to include, besides that for medical and scientific needs, what is required for making "prepared opium" for smoking so long as its suppression is unachieved, and for "non-medical internal consumption at present authorized in certain countries." This last reservation is presumably intended to cover the case of India, where it has been officially contended that the non-medical consumption—for example, eating—of opium or its employment as a household remedy will be provided for. Much discussion took place over the use of the poppy plant as raw material for the extraction of opium alkaloids, notably as practised in Hungary and Poland. It is stated that in 1936 some 1,400 kilogrammes of morphine were extracted from poppy straw. The question of how to deal with this problem—whether under the Limitation Convention of 1931 or in the same way as it is proposed to deal with raw opium under the new convention—appears to have been left an open question. Another matter which remains at present undetermined is as to whether there should be limitation of the area to be cultivated under the poppy as well as the limitation of the actual production of raw opium. Finally, it was pointed out that the future convention could not operate successfully unless it received practically world-wide application. The representatives of Turkey and Yugoslavia declared that their Governments would be unable to adhere to a convention which was not ratified by all the principal producing countries.

## INTRAVENOUS SEDATIVES IN PEPTIC ULCER

Efforts to find additional aids to the treatment of chronic peptic ulcer in the form of parenteral injections continue to be made. One such attempt recently reported by Daprà and Silvani[1] utilizes an old and well-tried friend in treatment—namely, sodium bromide. Their method, which was tried in eight cases, seems to be based on that described some twelve months ago by Landau and Hejman.[2] It consists of a series of intravenous injections of 10 c.cm. of a 10 per cent. solution of sodium bromide, together with 1 mg. of atropine sulphate. Atropine in sufficent dosage has a depressant effect upon vagus excitability and reduces the gastric acid secretion; it has long been used either orally or subcutaneously, and holds a definite place in the treatment of ulcer. Sedatives acting mainly upon the higher centres appear to have been less widely tried, though there can be no doubt as to the importance of emotional and nervous factors in the natural history of peptic ulcer. At the same time the experience of most observers has been that orally such simple sedatives as the bromides or the barbitones are often ineffective in relieving symptoms unless they are given in large doses; where relief of symptoms demand a sedative opium or one of its alkaloids is more usually needed and for short periods is often of the greatest assistance. On

[4] *Nature*, 1938, July 30, 212.
[5] *Lancet*, 1937, **1**, 793.

[1] *Minerva Med.*, 1938, **29**, 41.
[2] *Presse méd.*, 1937, **45**, 1468.

*a priori* grounds it would therefore seem unlikely that some 15 grains of bromide injected intravenously would act very differently in aiding the healing of peptic ulcer from an effective dose of, say, morphine given subcutaneously. The exponents of this form of treatment suggest that the depression of the central nervous system by the bromide and of the vagus by the atropine breaks a "vicious circle," so that the "equilibrium of the vegetative nervous system is restored" and healing may begin. Such a rationale and such a form of treatment demands an extensive and adequately prolonged study of a number of cases before it can be judged, in the words of Landau and Hejman, as "certainly marking a progress in the conservative treatment" of ulcer. These authors report three cases of chronic peptic ulcer, in one of which there was practically complete disappearance of an ulcer niche radiographically—after forty-nine injections! In all three patients symptoms quickly or gradually subsided, the observation periods being of some weeks' or months' duration. Conditions such as peptic ulcer in which periodic relapse and remission is the rule require prolonged periods of observation before the effect of treatment can be assessed. In few diseases can the *post hoc propter hoc* argument be less fairly applied.

## CERTIFICATION OF THE CAUSE OF DEATH

Dr. A. Hardisty Sellers of the Department of Health for Ontario has recently published an excellent paper[1] on the physician's statement of cause of death. The most interesting part of the paper is an account of a confidential inquiry in which the certifiers who had mentioned diabetes on a death certificate during a twelve months' period in Ontario were invited to state how far in their opinion diabetes had contributed to the fatal issue. The point of the inquiry was, of course, that under most rules of selection diabetes has so high a preference that if a rigid rule is enforced, then, in a tabulation by single causes it will usually be selected. In fact in this sample the rule would have assigned four-fifths of the deaths to diabetes. In the opinion of the certifiers only two-fifths should have been so assigned. In one-third of the cases which would under rule have gone to diabetes the disease had been present and recognized for ten years or more. As Dr. Sellers remarks: "Present methods tend to make statistics of causes of death a measure of the incidence of such diseases among the population at death, understating certain others as a result." For many years the policy of the English General Register Office has been to try to secure for tabulation the real opinion of the certifier and to render office rules obsolete. As the late Dr. T. H. C. Stevenson used to say, it is absurd to suppose that somebody in an office knows better than the practitioner who attended the patient what was the cause of death. Yet the adoption of office rules was due not to a double dose of original sin in "bureaucrats" but to a lack of precision in certification, and there are still countries in which the level of education or standard of duty of practitioners may compel the application of rules of selection. Indeed, in any country some certificates must always be so treated. There is good reason to believe that here the standard of certification is steadily rising.

[1] *Amer. J. publ. Hlth.*, 1938, **28**, 430

## "PERITONEOSCOPY"

Direct examination of the abdominal cavity by an endoscopic instrument is not a new procedure, and from time to time observations upon this method of diagnosis were made some years before the war. In a recent review E. B. Benedict[1] of Boston reports forty-eight personal examinations under the title "peritoneoscopy." Among some fifteen authors whose experiences of laparoscopy or peritoneoscopy he quotes the most extensive are those of Ruddock, who has examined over 500 cases and reports an accuracy of diagnosis in 91.7 per cent. The instrument he has devised is not unlike a cystoscope, consisting of a trocar (for putting air into the peritoneum) and a sheath into which a telescope, forceps, or diathermy connexion can be inserted. Only a local anaesthetic is required, and as a rule the abdomen is punctured just below the umbilicus in the mid-line. Air is forced in with an ordinary hand bulb, and according to Benedict the secret of successful visualization lies in having a large peritoneal air space. When free fluid is present this must presumably be tapped first. The dangers of the examination lie in the possibility of perforating the bowel, and Ruddock reports eight punctures in 500 cases, all without fatality. Other risks are those of causing haemorrhage and of spreading infection. It would seem to carry an undue risk in inflammatory conditions of the abdomen, especially when many adhesions are likely to be present and in any condition where the air distension of the abdomen might be dangerous—as, for example, severe cardiac disease. Benedict has found the investigation satisfactory, safe, and helpful in a number of conditions, of which carcinoma and cirrhosis of the liver, tuberculous peritonitis, and pelvic tumours may be mentioned. The relatively slight operation of peritoneoscopy may save the more serious laparotomy by demonstrating the presence of metastases in carcinoma of the stomach. Peritoneoscopy may be useful in the diagnosis of ascites of doubtful nature; but it must be admitted that it is in just such cases that visualization may be most difficult. Modern progress in endoscopic methods suggests that a renewed interest in direct abdominal examination may give better results in diagnosis of obscure abdominal conditions, and perhaps save some at least of those surgical explorations which reveal either an inoperable or a non-surgical state at operation. It must be confessed, however, that hitherto in this country little work appears to have been done on these lines, and only Short's[2] paper of 1925 is mentioned by Benedict. Certainly with the improved technique of endoscopic instruments further observations are likely to be recorded.

[1] *New Engl. J. Med.*, 1938, **218**, 713.
[2] *British Medical Journal*, 1925, **2**, 254.

# SURGICAL PROCEDURES IN GENERAL PRACTICE

*This is one of a series of articles contributed by invitation*

## INFECTIONS OF THE HAND AND FINGERS—I

BY

**NORMAN C. LAKE, D.Sc., M.D., M.S., F.R.C.S.**

There is no need to emphasize that the disabilities which follow in neglected cases of infections of the hand and fingers are of the gravest economic importance. It is usually considered that the loss of an eye is one of the most serious results of any injury, but there can be little doubt that the loss of the right hand is a more severe, if less dramatic, sequel. Similarly, the patient who has lost both hands is obviously more helpless than the patient who has lost his sight completely.

In this connexion it is of some interest to note that at the Ford factory in Detroit a survey has recently been made to see what percentage of the different jobs could be carried out by disabled men. It was found that of a total of 7,882 kinds of jobs, 2,637 could be done by one-legged men and only 715 by one-armed men. It must be remembered, however, that these figures refer to the peculiarly mechanical repetition work done in mass-production factories, and they also involve an expression of great good will and helpful intention on the part of the employer. In the open labour market the one-armed man's chances are obviously much smaller than these figures indicate.

It follows, therefore, that the treatment of cases of this type deserves the most careful attention. There is possibly no part of the body in which a knowledge of anatomical features is of greater importance, for rational and efficient surgical treatment depends as much upon anatomical as upon pathological knowledge in these cases. A review of the main anatomical points must therefore form an indispensable preliminary to any considerations of treatment.

### Skin and Fascia

The skin of the palmar aspect of the fingers is thick and tough, and in the vicinity of the joints it is held down to the digital extensions of the palmar fascia to form characteristic creases. The interphalangeal creases lie slightly proximal to the level of the corresponding joints, but the metacarpo-phalangeal crease at the base of the digits lies about half an inch distal to the knuckle-joint. Over the palm also the skin is intimately attached to the underlying palmar fascia. The creases here form the characteristic "lines" of the palmist, but have little surgical significance. A small amount of fat intervenes between skin and fascia, and is divided into a large number of small loculi by fibrous septa. Over the proximal and intermediate phalanges, too, a similar arrangement holds, while in the pulp of the distal segment the arrangement is so characteristic and important as to deserve special consideration. The object of these attachments of skin to deeper structures is clearly to prevent excessive movement of the skin during prehension, otherwise the facility with which objects are held would be considerably diminished. In the pulp of the fingers and thumb the fibrous septa are particularly well marked, and the amount of fat is, of course, greater than in the other segments of the digit. These fibrous septa, extending from the skin to the periosteum of the terminal phalanx, divide the fat into a series of loculi disposed with their long axes vertical to the surface. The pulp is thus divided into a large number of spaces arranged rather like the cells of a honeycomb (Fig. 1).

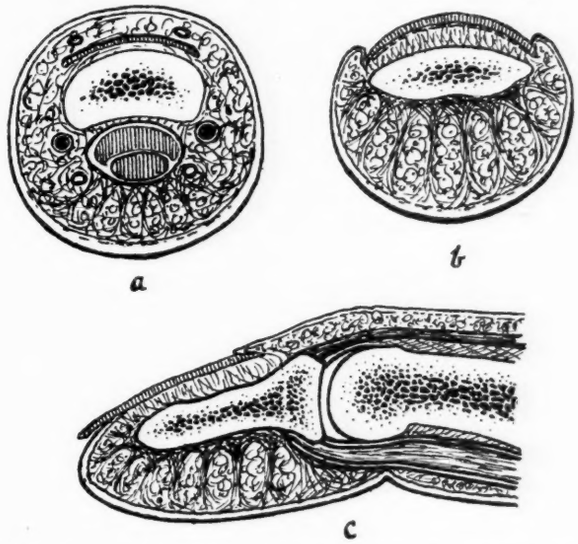



FIG. 1.—*a*, and *b*, transverse sections through proximal and distal phalanges of finger. *c*, longitudinal section through termination of finger. Note the loculation of the fat, especially in the terminal phalanx, and the relation of the long tendons to the epiphyseal line.

In the presence of infection, inflammatory exudations are therefore unable to spread widely, as they can do elsewhere, but are retained in the loculi, producing an extreme degree of tension which is frequently sufficient to interfere with the blood supply. This arrangement, too, provides many channels by which superficial infection of the skin can be conveyed directly down to the underlying bone. Under the skin creases there is very little subcutaneous fat, and here the tendon sheaths closely approach the surface, so that minor penetrating wounds may carry infection into them.

On the dorsal aspect of both fingers and hand the skin is much looser, to permit of flexion; this produces the characteristic creases over the backs of the fingers. These lie roughly at the same level as the corresponding joints. The dorsal subcutaneous tissue is also loose and areolar; it thus accommodates large quantities of inflammatory exudation, and is indeed the position in which such exudations tend to collect even when the causative infection is on the palmar aspect of the hand. The bed of the nail is fairly firmly attached to the underlying periosteum; the nail itself thus affords good counter-pressure to forces applied to the finger-tips, and in this way helps prehension. Only the slightest amount of to-and-fro movement can normally be detected in the nails; the range is increased and the movement becomes painful in affections underlying the nail, in its bed or in the bone.

The palmar fascia forms a dense fibrous barrier which usually prevents deep-seated pus from reaching the surface

of the palm. In the proximal half of the hand it forms a fairly continuous ensheathing layer, but in the distal half its digital prolongations separate from one another, and in the intervals the digital nerves and vessels become more superficial. At the sides the dense palmar fascia is continued as a thinner sheath covering the muscles of the thenar and hypothenar eminences (Fig. 2).

Under cover of the fascia, in an areolar interval, lie the superficial palmar vascular arch with its digital

Fig. 2.—Diagram of the palmar fascia.

branches and the digital branches from the ulnar and median nerves. At first the nerves lie deep to the vessels, but as the roots of the fingers are approached the nerves come to occupy an anterior position and run along the digits on the lateral aspects of the flexor sheaths (Fig. 3).

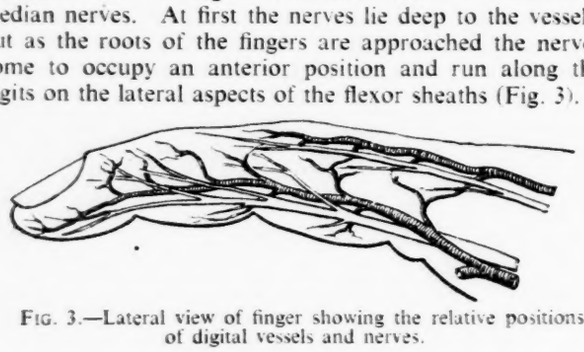


Fig. 3.—Lateral view of finger showing the relative positions of digital vessels and nerves.

### Tendon Sheaths

Deep to the vessels and nerves lie the tendons in their sheaths. The latter afford a ready means for the spread of infection, so that special attention must be paid to their arrangement. This is subject to a little variation, but in general it may be accepted that the sheaths of the flexor tendons of the second, third, and fourth fingers extend from the base of the terminal phalanx to the distal skin crease of the palm. In the case of the little finger the theca usually extends up through the palm and becomes continuous with the large palmar bursa (common flexor sheath), which surrounds the profundus and sublimis tendons proximally. This large sheath extends upwards under the anterior annular ligament of the wrist into the forearm, terminating about two fingerbreadths proximal to the ligament. The long flexor of the thumb has a sheath of its own which extends from the base of the terminal phalanx up under the annular ligament and ends

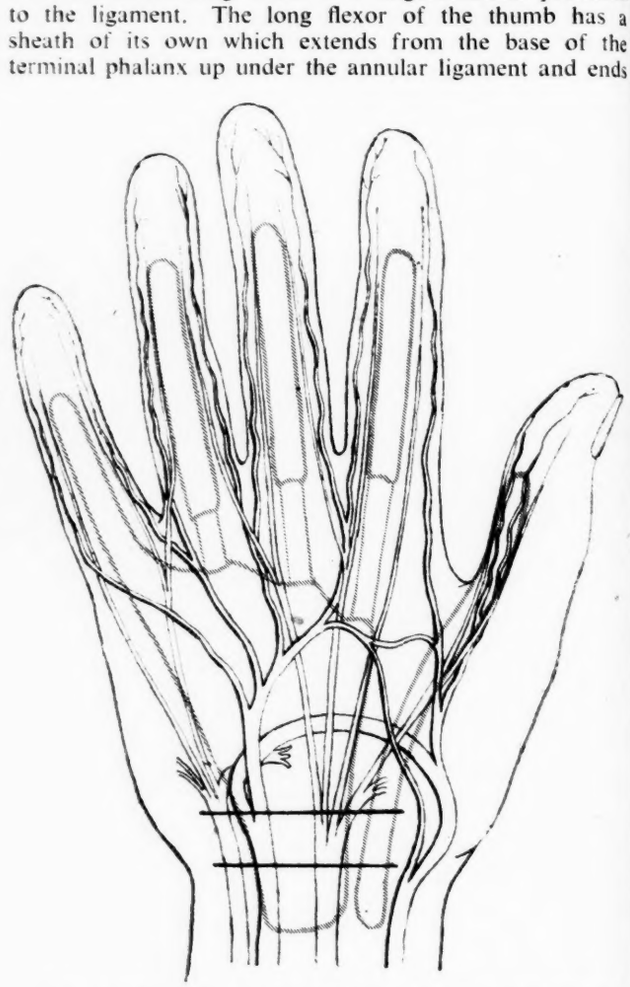


Fig. 4.—Transparency showing the relation of the tendon sheaths to the chief overlying structures. The horizontal lines represent the limits of the anterior annular ligament.

at the same level as the palmar bursa (Fig. 4). All the digital synovial sheaths are contained within fibro-osseous canals, formed on the deep aspect by the periosteum of the phalanges and over the joints by the glenoid ligaments thereof, on the palmar and lateral aspects by a transversely fibred arch with which the digital extension of the palmar fascia is blended. These sheaths are especially thickened where they lie over the proximal and intermediate phalanges, but opposite the joints they are thinner and more lax. Cruciate bands are usually present at the junction of these sections. Even when the sheath is distended by inflammatory exudations the tendon remains a fairly tight fit at the restricted points, and it is here that localizing adhesions may form to limit the spread of infection.

Initially during development a tendon running in a sheath has a complete mesotendon bearing the same relation to it as the mesentery does to the intestine. The special arrangement of the flexor tendons of the fingers by which the superficial one splits to permit the passage of the deep tendon does not, however, allow of the persistence of this early arrangement. Most of the mesotendon therefore disappears, but the remains can be recognized as the vincula tendinum. This small point is of special importance because the blood supply of a tendon

reaches it, at least in part, through the mesotendon. In the fingers, therefore, the vascular supply will be derived chiefly from the ends of the synovial sheath, and will receive but little reinforcement along the length of the tendon. Small vessels extend along the tendon in the synovial covering, and from them the substance of the tendon receives its nutritive supplies, mainly by transudation. It will thus be seen that the nutritive supply of the digital flexor tendons is particularly precarious. It is true that passive structures such as tendons require very little nutrition in normal circumstances, but any slight increase in tension within the theca will be sufficient to cut off the blood supply entirely, and this, of course, will lead to necrosis followed by invasion of the tendinous tissue by the organisms.

### Fascial Spaces

Kanavel has described the routes by which infection spreads in the hand. By the injection of opaque materials into various regions of the palm he was able to demonstrate, both radiographically and by dissection, that the spread of these substances tended to be restricted to certain compartments, and upon this basis he was able to establish rational methods of surgical drainage. Valuable as Kanavel's work was from the anatomical point of view, we must not forget that the barriers which limited the spread of his injected materials would not, of necessity, have more than a temporary retarding effect upon the spread of organisms. As a basis for our studies, therefore, his ideas will be admirable, but in practical application we must be prepared to find that infection is only rarely limited to any one particular space or structure.

We have seen that only the thinnest layer of fibro-fatty tissue intervenes between the skin and the palmar fascia, and so loculated is this tissue that infection in the superficial layer is unable to spread beyond a short distance before the skin is perforated and spontaneous drainage stops further extension. On the dorsal aspect of the hand there are two loose areolar spaces, one between the skin and the extensor aponeurosis (the dorsal subcutaneous space) and one between the aponeurosis and the bones (the dorsal subaponeurotic space). These are the spaces in which oedema is chiefly seen in infections involving the palmar spaces, the great density of the palmar fascia preventing anything more than an undue fullness of the "cup" of the palm when deep-seated infection is present.

Deep to the palmar fascia the areolar intervals are divided into two main sections by the fascia covering the adductor transversus muscle. The palmar (mid-palmar) space is an extensive and important area lying deep to the profundus tendon and anterior to the third, fourth, and fifth metacarpal bones, with their corresponding interossei (Fig. 5). It is bounded on the inner and outer sides by partitions passing from the deep aspect of the palmar fascia to the third and fifth metacarpals respectively; the former is strong, and separates this space from the thenar space. Proximally the palmar space extends, by a narrow passage, to the deep space of the forearm, while distally it is continuous with the third and fourth web spaces and, by prolongation along the lumbrical tendons, with the dorsal subaponeurotic space. The thenar space lies between the palmar fascia and the adductor muscle, extending around the distal border of that muscle on to its dorsal aspect. It is separated from the palmar space by the fascia already mentioned; this corresponds superficially with the skin crease running along the inner aspect of the thenar eminence. Externally it extends deep to the thumb muscles as far as the first metacarpal bone, and distally it communicates with the web spaces of the index and thumb, and, via the first lumbrical canal, with the dorsum of the hand. It has no extension to the deep spaces of the forearm.

The web spaces lie between the heads of the metacarpals and are continuations of the palmar and thenar spaces to the dorsal aspect of the bases of the fingers; there they communicate with the subcutaneous spaces of the dorsum of the hand. The deep fascial space of the forearm lies under the profundus tendons and superficial to the pronator quadratus. It continues proximally, superficial to the interosseous membrane, so far as the origin of the deep muscles from that structure.

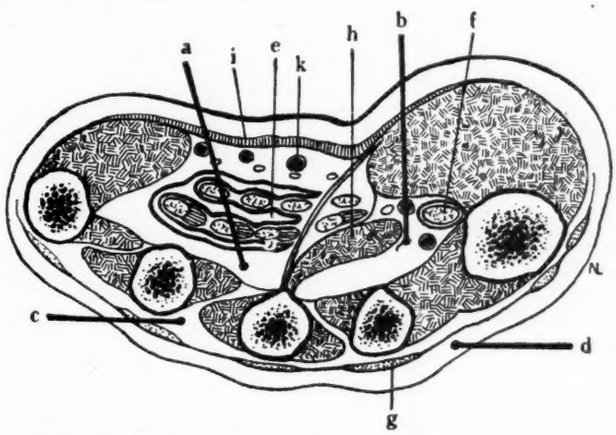



FIG. 5.—Diagrammatic transverse section of the palm showing disposition of the various spaces, (*a*) The palmar space, (*b*) thenar space, (*c*) dorsal subaponeurotic space, (*d*) dorsal subcutaneous space, (*e*) common flexor sheath (ulnar bursa), (*f*) tendon of extensor longus pollicis, (*g*) extensor tendons, (*h*) adductor pollicis, (*i*) palmar fascia, (*k*) digital vessels and nerves.

It must be realized that the common flexor sheath lies immediately superficial to the palmar space, while the sheath of the flexor longus pollicis is surrounded by the thenar space; infections therefore extend with ease from one structure to the other.

### Joints

The interphalangeal and metacarpo-phalangeal joints are all in fairly intimate relation to the tendon sheaths, and it has already been mentioned that their volar (glenoid) ligaments form part of the thecal canal. The phalanges themselves have, before the age of about 20, an epiphysis at their proximal end, and the same applies to the first metacarpal. The other metacarpals have an epiphysis at the head. The blood supply to that part of the bone derived from the epiphysis reaches it largely along the capsule of the joint, through the section of the digit immediately proximal (see Fig. 1). This is important in the case of the terminal phalanx, for when the pressure of exudation in the terminal segment cuts off the blood supply to the bone its base is still able to derive a supply in this way, and so bony necrosis rarely extends beyond the level of the epiphyseal line (even when this is completely ossified in the adult), and infection of the interphalangeal joint is thus prevented; the insertions of both flexor and extensor tendons remain intact and the theca is not involved.

The main palmar bursa (common flexor sheath) is considerably restricted as it passes deep to the anterior annular ligaments; at this point, therefore, the spread of infection may be at least temporarily arrested. For the same reason any subsequent adhesions are always densest

at this level. Since the theca of the little finger is continuous with the main bursa it is obvious that the nervous and vascular supplies of the ulnar border of that finger must cross the sheath. The vascular and nervous supplies of the radial side of the index finger cross the proximal end of the theca of that finger deep to the palmar crease in this situation. The thumb sheath is deeply buried as it passes between the muscles of the thenar eminence. It is important to note that this sheath is crossed superficially by the branches from the median nerve which supply these muscles.

*(To be continued)*

# A COMPARISON OF PHYSICAL STANDARDS IN TWO GROUPS OF NEWCASTLE CHILDREN

BY

**H. G. MILLER, M.B., B.S.**

*House-physician to the Royal Victoria Infirmary, Newcastle-upon-Tyne*

Investigations into the physical standards of sample groups of school children of various social classes have shown in most instances that the children of the upper classes are taller and heavier and have blood richer in haemoglobin than children of the poorer type; while Spence has shown that in Newcastle there was a wide difference between the health and development of the infants in his sample group of "city children" and the similar group of "professional class children" which he examined.[1]

The present investigation was carried out in an endeavour to assess the result of an improvement in environment at an early age on one of two groups of children of strictly comparable heredity. The most hopeful approach seemed to be in comparing, by the same individual technique as that used by Spence, a group of slum children with children living in the physically favourable environment of an orphan institution, the latter having a heredity comparable to, and certainly no more favourable than, the former. The group chosen were the seventy-five children between the ages of 5 and 14 years residing in the Newcastle Education Committee's Ponteland Children's Home—the "Ponteland children"—and a similar number of children of identical age and sex distribution attending the Jubilee Street Council School, situated in a poor part of Newcastle—the "Jubilee children."

The difference in environment may be inferred from the fact that the Ponteland children were living in a pleasantly situated self-contained village some miles from Newcastle, eating a diet costing an average of just over four shillings and sixpence a head per week (and purchased *en bloc*), which was properly balanced and included meat at least once a day and an average of just under one pint of fresh milk daily. The parents of 50 per cent. of the Jubilee children were unemployed, and these children were presumably eating a diet costing at any rate not more than three shillings per week which the Unemployed Assistance Board provides for all the necessities of life; with, in addition in certain cases, free milk daily and in a very few cases (not 5 per cent.) free meals.[1] On inquiry not more than 10 per cent. of the Jubilee children had eaten protein of any kind at their midday meal on the day of examination—broken biscuits appeared to be a staple article of diet.

The two groups of seventy-five children were carefully examined by me with reference to their general condition, their height, weight, and chest measurement, their teeth, and their haemoglobin indices.

[1] Spence, J. C. (1934): *Investigation into the Health and Nutrition of Certain of the Children of Newcastle*, Newcastle.

The Ponteland children were not admitted to the home until the age of 3, and no accurate information was obtainable about their environment during the first three years of life. All that can be said of these early years, which are shown to exert a crucial influence on the later development of the children, is that they were spent in the large majority of cases either in a Poor Law institution or under very unfavourable conditions of life outside. It seems improbable, however, that under normal conditions any more sharply defined groups as regards environment will be obtainable.

The assessment of general condition was of course subjective, but I endeavoured to take into account colour, muscle tone and stance, skin temperature, and general alertness.

### General Condition

| | Ponteland | Jubilee |
|---|---|---|
| Optimum (children in every way fit) .. | 37 | 7 |
| Poor (children obviously unfit) .. .. | 1 | 9 |
| Others .. .. .. .. .. | 37 | 59 |

For comparisons of weights and heights optimum zones were made by weighing and measuring several hundred children in Newcastle high schools and preparatory schools, plotting their weights and heights on graphs, and constructing zones to include the large majority. Separate zones were made for boys and girls, but for convenience of reference the results are here grouped together:

| | Heights | | Weights | |
|---|---|---|---|---|
| | Ponteland | Jubilee | Ponteland | Jubilee |
| Children *above* optimum zone | 0 | 0 | 0 | 1 |
| Within .. .. .. .. | 24 | 19 | 10 | 15 |
| Below optimum zone .. .. | 51 | 56 | 65 | 59 |

As will be seen, the children of both groups fall almost completely below the optimum zones of the "high-school" children. When the zones used were based on the figures of the British Association's Anthropometric Committee (1875–83), employing the committee's average as an upper limit and a line 10 per cent. below this as the lower limit of the zone, the Ponteland and Jubilee children are seen to fall very well within these limits and show no significant discrepancy—that is to say, the difference between the weights and heights of the high school and the Ponteland children is of the same order as that between the high school and the Jubilee children.

| | Heights | | Weights | |
|---|---|---|---|---|
| | Ponteland | Jubilee | Ponteland | Jubilee |
| Above B.A. average zone .. | 12 | 17 | 20 | 18 |
| Within .. .. .. .. | 61 | 57 | 40 | 46 |
| Below .. .. .. .. | 2 | 1 | 15 | 11 |

It is of interest to note that when the weights and heights of the high school group were plotted against these B.A. zones the following results were obtained.

| | Heights | Weights |
|---|---|---|
| Above average zone .. .. | 93 per cent. | 84 per cent. |
| Within .. .. .. .. | 7 „ | 16 „ |
| Below .. .. .. .. | 0 „ | 0 „ |

Quite evidently the British Association Anthropometric Committee's averages, assessed as they were from the measurement of children preponderantly of the poorer classes, should be taken not as normal weights and heights but rather as depressed averages.

The chest circumference measurements, taken in full inspiration, were recorded on the case-sheets, but in my opinion they depend so much on the enthusiasm of the examinee as to be valueless.

Examination of the teeth revealed what I believe to be significant differences.

| | Ponteland | Jubilee |
|---|---|---|
| Perfect dentition: No caries or history of caries | 8 | 2 |
| Hypoplasia, with no gross caries or history of caries | 15 | 3 |
| Gross caries or history of caries | 52 | 70 |

These figures show that twenty-three of the Ponteland children were free from caries, as against only five of the Jubilee children. In addition, active extensive caries (four teeth or more involved) was present in six of the seventy-five Ponteland children, as opposed to twenty of the seventy-five Jubilee children. The most significant differences, however, appeared in the haemoglobin indices (estimated by the Sahli haemoglobinometer—standard = 14 grammes per 100 c.cm.).

| Hb percentage | Ponteland | Jubilee |
|---|---|---|
| Above 85 per cent. | 13 | 1 |
| 70 to 85 per cent. | 58 | 47 |
| Below 70 per cent. | 4 | 27 |
| Below 65 per cent. (also showing clinical anaemia) | 0 | 6 |

Conclusions as to the significance of the differences recorded in dealing with such small groups of subjects must of necessity be tentative. Briefly, while the weights and heights of the two groups showed no appreciable difference, both being distinctly suboptimum, the general condition, the teeth, and the haemoglobin indices of the slum children were distinctly inferior to those of the children's home group.

These facts suggest that although improvement in environment after the age of 3 had led to distinct improvement in general condition, teeth, and blood, it was without effect on subsequent growth. It would appear that such growth was decisively affected by conditions during the first three years of life, and that subsequent improvement in environment did little to modify this. But the improved conditions of the Ponteland children in other respects did seem to be accompanied by a heightened resistance to disease, and as a community the children's home appears to have a suggestively low incidence of illness. On these and other grounds weight and height *per se* seem to be falling into increasing discredit as indices of health.

**Summary**

A comparison of a group of school children from a poor part of Newcastle with a similar group from a children's home revealed that although the weights and heights of the two groups showed no appreciable difference and were both suboptimum, the general condition, the teeth, and the haemoglobin indices of the children's home group were distinctly superior to those of the slum children.

I wish to thank the various education authorities and individuals who so kindly facilitated the collection of the data used; and Dr. J. C. Spence for his constant stimulation and advice.

# THE MEDICAL PROFESSION AND NATIONAL DEFENCE

## DUTIES OF DOCTORS AND NURSES

*The following announcement was made by the Ministry of Health on Tuesday night:*

The Ministry of Health is receiving inquiries from doctors and nurses asking what they would be expected to do in the event of hostilities. Some already have commitments to the Forces or to the A.R.P. or other public services. Those who are not committed in this way but are attached to hospitals would no doubt be required there, and should in any case keep in touch with their hospitals.

Doctors and nurses in private practice may be able to afford valuable assistance in local air raid precautions schemes, and if they are willing to help in this way they should get into touch with the medical officer of health. They may also be required for treating casualties in their own homes.

The British Medical Association, at the request of the Government, has compiled a register of doctors who are prepared to serve in various capacities, and use will be made of this register for importing doctors into a district where there is urgent need of additional medical assistance. Any doctor who has not yet responded to the inquiries from the British Medical Association should do so without delay, and if he does so he will, when need arises, be told where and in what capacity his services are required.

Until similar machinery is instituted for the nursing profession, any nurses who are willing to offer their services but are not in touch with hospitals should enrol with the local branch or head office of the College of Nursing, whether they are members or not. This applies only to State-registered or certificated nurses, including those who have given up practice.

There is no need for doctors or nurses to offer their services directly to the Ministry.

## HOSPITAL ACCOMMODATION FOR AIR RAID CASUALTIES

*The following statement on hospital accommodation for air raid casualties was issued by the Ministry of Health on September 22.*

The Ministry of Health has made rapid progress in organizing the hospital system to meet any emergency that may arise, and it is now possible to give a general picture of the proposals.

Hospital authorities were told by the Ministry in August that they would be expected, if an emergency actually occurred, to empty as many beds as possible by sending home those patients who are fit to go. It is estimated that most hospitals would be able to clear between 30 per cent. and 50 per cent. of their beds in this way. No hospital is expected to take any step of this kind until asked to do so by the Ministry, and it is unnecessary to say that no such request has yet been made. The majority of patients going home would be sitting or walking cases, and hospitals have been asked to arrange for transport of their cases themselves by means of voluntary effort. The Women's Voluntary Organization would help in this work. Once at home discharged patients would, of course, come under any general arrangements for evacuation for their districts.

Simultaneously with sending patients home, certain hospitals, for the most part the larger general ones in the more congested areas, would "decant" patients fit to be moved, though not yet fit to go home, to other institutions which are fully capable of continuing the

necessary treatment, but which would be less useful for receiving air raid casualties. In the London area thirty-four hospitals have already been designated for "decanting," and detailed plans prepared for removing between 3,000 and 4,000 patients by ambulance trains to towns 50 miles or more from London. The patients would be conveyed to the railway stations by motor coaches converted to carry stretchers. The necessary stretchers are available and held centrally for distribution if and when required. Fittings for the coaches have been made, and 300 can be converted into ambulances at twelve to twenty-four hours' notice. The owners of the coaches know exactly where they would report, and what journeys they would be required to make. The necessary arrangements have also been made with the railway companies. Other hospitals in the London area would "decant" patients a shorter distance in order to empty beds, and these would make the whole journey by bus.

The Ministry has been in close touch with the London County Council throughout. As already announced, one of the senior medical officers of the County Council is acting as hospital officer for the London district. The Ministry has also conferred with representatives of all the voluntary hospitals involved in the "decanting" scheme, and explained the proposals to them in detail; and before the end of the week conferences will have been held with representatives of all the other voluntary hospitals in the district. Conferences have also been held with all the medical officers of health of the counties and county boroughs in the Home Counties, and of the towns receiving the patients decanted from London. Arrangements are being made in these towns for meeting the ambulance trains and conveying the patients to designated hospitals. It may be added that the London County Council has been authorized to provide surgical equipment at some of the larger hospitals not at present used for surgical cases, so that these, which have a good deal of available ward room, would be fully equipped for dealing with casualties if necessary.

Plans for clearing hospital beds by "decanting" patients have similarly been worked out in the provinces by the Ministry's hospital officers. These officers are in touch with the local hospital authorities, and in addition conferences have been held in Whitehall with the medical officers of health of the large cities.

So far the plans made have been concerned principally with the utilization of existing accommodation and equipment. The Ministry has, however, taken steps for the acquisition of additional equipment which will be distributed when available to different centres. Meanwhile, information has been collected as to the stocks of bedsteads, bedding, and other necessary equipment held by the trade in various towns, and, if necessary, arrangements would be made to supplement existing stocks from these sources.

While the Ministry has now conferred directly with a great many hospital authorities, both municipal and voluntary, it has not yet been possible to do so with all of them. It is intended very shortly to arrange a further series of local conferences at which Dr. Hebb, the Principal Medical Officer advising the Minister on the emergency hospitals organization, will discuss details of the schemes with the authorities.

In a later communication the Ministry urges private owners of cars which are not already earmarked for transporting patients and which are not being used for any other essential purpose to assist in this evacuation by getting into touch with their local hospital and offering to send their cars (with drivers) to the hospital for use if required as conveyances for the patients.

### L.C.C. Emergency Measures

The London County Council has taken prompt and energetic steps to make available the greatest possible number of beds in the event of outbreak of war, and we understand that the arrangements that have been made in conjunction with the Ministry of Health will put at the disposal of the public between 20,000 and 25,000 beds for emergency treatment in the County of London. In addition to that arrangements have been made by the Ministry to transfer between 3,000 and 4,000 patients from voluntary and municipal hospitals to hospitals in towns situated some fifty to sixty miles outside London. In addition to plans for the evacuation of cases all available extra beds and mattresses have been put up throughout the whole of the L.C.C. hospital service.

The medical superintendents of L.C.C. hospitals have been advised to evacuate patients who would be fit to be discharged a day or two earlier than would otherwise have been the case, and to select other patients who could be discharged without hardship to themselves immediately on the outbreak of war. They have been advised, too, in co-operation with the general practitioners in the areas of the hospitals, to defer the admission of patients who are not in urgent need of treatment—for example, patients with hernia, varicose veins, etc. Similarly, in the tuberculosis hospitals the admission of non-urgent cases has been postponed. Fever hospitals have been instructed not to admit cases of such mild infectious diseases as chickenpox and mumps. These hospitals have been "up-graded" by the supply of additional surgical equipment and dressings so that they will be able to take their place as acute casualty hospitals. Where it has been possible each fever hospital has been divided into two parts: (1) for the admission of fever cases, and (2) for the treatment of air raid casualties.

The L.C.C. hospitals are also being provided with an extra stock of fuel, the equivalent to one month's extra stock of drugs, dressings, etc., and an extra stock of foodstuff equivalent to approximately one month's supply. The hospitals are also actively engaged in making arrangements for the blacking out of their buildings in accordance with the police regulations and for introducing such other emergency measures as are dictated by circumstances.

# Local News

## FRANCE

[From our Correspondent in Paris]

### Professor Clovis Vincent

Dr. Vincent's work as a surgeon in Paris has proved of such value that the Assistance Publique, which is responsible for the administration of this city's public hospitals, created some time ago a special hospital service under his direction. He has now been appointed a professor at the Faculty of Medicine, with clinical neurosurgery as his specialty. The creation of this new chair has been made possible by a donation from the Rockefeller Foundation in recognition of Vincent's pioneer work.

### Fiftieth Anniversary of the Pasteur Institute

On October 26 the fiftieth anniversary of the Pasteur Institute will be celebrated in the Grand Amphitheatre of this institution in the presence of M. Lebrun, President of the Republic, the Minister of Public Health, and many others. This celebration will coincide with the first International Congress of French-speaking Microbiologists, all the delegates to which have been invited by the Director of the Pasteur Institute to be present at the celebration. Inquiries with regard to the congress should be addressed to the secretary of the Association des Microbiologistes de Langue Française, Institut Pasteur, 28, Rue du Dr.-Roux, Paris, XV.

# AUSTRALIA

### Poliomyelitis in Victoria

The Director of the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Dr. Charles H. Kellaway, has just presented his annual report for the year 1937–8. In Victoria, during the epidemic of poliomyelitis which only came to an end in February of this year, no difficulty was experienced in transferring the poliomyelitis virus to monkeys; four strains are now available for future work. Monkeys recovering from the inoculation of the local virus, however, showed only partial immunity to the regularly fatal "M.V." strain. During the epidemic there were collected for subsequent investigation many samples of serum from cases early in the febrile period and from contacts, at the time of contact and four to eight weeks later.

During the early winter of 1937 some two hundred individuals were given intranasally two inoculations of living, egg-adapted, "Melbourne" influenza virus, a strain which can be clearly differentiated antigenically from the "W.S." and "swine" strains. No epidemic of influenza occurred, so the experiment has only shown the harmlessness of the procedure and an increased antibody response after inoculation in a few of the subjects. Work on "Q" fever has continued, and other researches have been concerned with the problem of cell injury, the liberation of histamine, and with various clinical problems.

# Correspondence

### Convalescent Serum in Infantile Paralysis

SIR,—The case against the therapeutic value of convalescent serum was summarized in your columns by me some five years ago (December 30, 1933). The information upon which it was based is generally accessible, and to restate the case now would be a waste of your space. Professor G. R. Girdlestone (*Journal*, September 24, p. 678) is right in saying that in the past the use of serum has not always been such as to provide reliable evidence of its value, and his own use of it—upon which he formed his favourable view—was admittedly of this order. There is an increasing weight of evidence based upon adequately controlled observation that serum treatment has no value, but there is also experimental evidence even more conclusive to which Professor Girdlestone does not refer—namely, the fact, long known, that this serum does not modify the course of the disease in the inoculated monkey when given under the only conditions possible in the human subject—that is, after the onset of symptoms. Recent pathological work has shown why this must necessarily be so. Therefore the serum treatment of poliomyelitis is as lacking in rational basis as in practical justification. Nor can we reasonably hope that the future will reverse this verdict of experience in the past. Dosage has been steadily increasing since Netter in 1910 introduced this treatment, yet no one has been able to claim better results than he claimed for the use of what later workers would regard as quite absurdly inadequate dosage.

It is therefore essential that Professor Girdlestone's act of faith should be recognized as such rather than as a scientific judgment based upon facts, and even more important that the hopes of the public should not be cruelly raised. The cherishing of therapeutic illusions by the distressed parents of a sufferer from acute poliomyelitis must place the family doctor, the consultant, and the local health authority in a wholly false position in which it is not equitable that they should be placed. Two recent letters in the *Times* show how easily this may happen, and the situation is one that Professor Girdlestone cannot possibly wish to bring about.

In his first letter, with a candour I respect, he expressed himself as aware that he was venturing out of his proper sphere. Yet it is in these circumstances that acts of faith become the easy substitutes for reasoned judgment, and dangerous ones in that they bear the appearance of a medical authority they do not in fact possess.—I am, etc.,

London, W.1, Sept. 24. F. M. R. WALSHE.

### Prognosis of Anxiety States

SIR,—In his interesting paper on prognosis of anxiety states in the *Journal* of September 24 (p. 649) Dr. Arthur Harris, speaking of follow-ups, says: "Luff and Garrod have traced their cases for three years and Ross some of his cases for five years and the rest for three years." So far as my cases are concerned this is a complete mis-statement of fact. If Dr. Harris will glance at the table on page 79 of my book, *An Enquiry into Prognosis in the Neuroses*, he will see that I had traced the after-histories of 943 patients over periods varying from three to thirteen years. If he will look at the top line, which refers to patients discharged from the Cassel Hospital in 1921, he will see that the after-histories of twenty-two out of fifty-eight patients were known at the end of thirteen years. On the next line, referring to the 1922 discharges, it will be found that another forty-three patients out of ninety-eight discharged in that year were known about at the end of twelve years, and so on. At the end of ten years 102 patients out of 254 were known about.

I must suppose that he was misled by a note printed after the 1929 discharges, which said that there were no more five-year histories after that date, a thing that is of course obvious, seeing that the inquiry ended in 1934; but the note said nothing about the years before 1929.

Dr. Harris's paper is one of great value, all the more as he recognizes the immense difficulties surrounding an inquiry of this sort. I would, however, ask him to look also through pages 37–55, with a hope that he may become less pessimistic about patients whose symptoms are of long standing.—I am, etc.,

London, W.1, Sept. 24. T. A. ROSS.

### The Nature of Viruses

SIR,—The annotation entitled "The Nature of Viruses" (*Journal*, September 24, p. 667) accepts as the "hall-mark of living things in the final issue" their posession of an "independent metabolism." Presumably these words may be held to signify that this possession differentiates "living things" from something else. The word "independent" has, however, no meaning unless that of which the affair in question is independent is stated. Is this an invitation by the writer to conceive the metabolism of "living things" to be characterized by independence of their environment? If not, in what then does the alleged independence consist?

It has proved necessary to abandon one by one the traditional distinctions drawn between "living things" and other terrestrial units; it does not seem likely that the distinction cited in the article will enjoy any better fate. It would occupy too much space to set out the evidence against its validity. I prefer to use what you will allow me for suggesting that the time has come when the conception of a fundamental difference *in nature* between

"living" and "non-living" should be abandoned in favour of the more comprehensive one of differences in the behaviour of different groups, arising solely out of differences in their organization.

There are broad differences between the behaviours of the atom unit, the molecule unit, and the colloid unit, all these being groups in the sense in which I am using this word. Any group belonging to any of these three classes which is stable for an appreciable period of time may conveniently be conceived and described as an *individual* for the period of its stability. The "things" which have hitherto been called "living" are otherwise describable as colloid individuals, different from the atomic and molecular individuals not as to the nature of their elements but as to their organization only. The time-occupying stability of all groups (individuals) may be interpreted as a balance phenomenon, the terms of the balance being group $\rightleftharpoons$ environment. To no group, and to no detail of the organization of any, may the term "independent," in the literal sense of this word, be properly applied. The term "parasitic" conventionally describes a peculiar relation whose essential feature is that the immediate environment of some individual of the colloid-group class is constituted by another individual of the same class.

If the word "living" is continued in use it should be used to connote a peculiar organization and the peculiarities of behaviour that go with this. There is no longer warrant for conceiving that the elements which constitute the individual of the colloid-group type differ *in nature* from those which constitute the atomic and molecular individuals of the earth's surfaces.—I am, etc.,

London, W.1, Sept. 25. K. W. Monsarrat.

## Diagnosis of Whooping-cough

Sir,—One regrets that in a five-page critical review of laboratory aids to the diagnosis of whooping-cough (*Journal*, September 17, p. 613) Dr. A. B. Donald was able to devote only four lines to agglutination tests, briefly arriving at a conclusion that such tests were unreliable and useless as a method of diagnosis.

One hesitates to accept this dogmatic statement without details of the method adopted, because it is well recognized that the *Haemophilus pertussis* has four phases of growth *in vitro*. Whereas Phases II and IV give little or no agglutination and are in fact "rough" colonies, Phases I and II are "smooth" and virulent, and are actively agglutinated by convalescent and possibly third- and fourth-week sera.—I am, etc.,

Watford, Herts, Sept. 20. A. Gordon Moore.

## The Occipito-posteroir Case

Sir,—It was with horror and dismay that I read Dr. David Price's letter (*Journal*, September 17, p. 638). Coming as it did a week after Professor Chassar Moir's excellent paper on this subject, the horror was intensified. There are a few points in the letter which cannot go unchallenged. To apply forceps before the os is fully dilated is, at the best of times, undesirable; still less so is it when it is made a routine. His statement that he has never regretted the use of forceps, whether the os is fully dilated or not, leaves no hope of salvation for him. Does he really diagnose the occipito-posterior position by failure to extract with forceps? I should have thought that after thirty-five years he would be aware of the value of vaginal examination with the hand and fingers. How does he diagnose a breech presentation? By applying forceps and seeing what he pulls out, in the manner of a lucky dip? Mechanical rotation seems to be the least serious of his errors, although I had hoped that this was being abandoned. For his courage in confessing his errors in the *Journal* I have nothing but admiration. I, personally, would never have been brave enough to do it.

Finally, may I plead with Dr. Price to give Nature a chance in his next case. I venture to assert that he will be amazed at Nature's efficiency.—I am, etc.,

Newcastle-upon-Tyne, Sept. 19. Stanley Way.

## Medical Evidence at Inquests

Sir,—There have been two unfortunate occurrences in my experience in cases where the coroner has engaged a professional pathologist (now dead) to perform the necropsy. In the first I was invited, as an act of courtesy, to see the examination; on arriving I found it completed and a diagnosis made of death from pulmonary embolism. At my request the cervical vertebrae were examined, and there was found the fracture which had been suspected during life. The actual cause of death was the pressure on the medulla of a haematoma resulting from this injury. The other case was one of Landry's paralysis where the spinal cord was not even looked at. As the patient had been a healthy young man it does not need much imagination to understand the pathologist's difficulties.

Surely when the coroner thinks it important to employ an outside medical man—and in many cases there may be a good deal to be said for his doing so—it is very desirable that the deceased's own doctor should be invited to attend at the necropsy and should be paid for doing so.—I am, etc.,

Sydenham, Sept. 22. W. M. Penny.

*** This correspondence is now closed.—Ed., *B.M.J.*

## Tuberculosis Dispensaries or Chest Clinics?

Sir,—Dr. G. Gregory Kayne (*Journal*, September 17, p. 634) introduces his solution of this question with the words "failing education of the public to recognize that disease is not a stigma. . . ." I should like to ask whether we could not help to eradicate the peculiar stigma attaching to pulmonary tuberculosis. I suggest two moves in this direction.

First, we should be less squeamish in talking about tuberculosis to patients. The present attitude is instilled into the student and stays with most doctors, who will refer to "lung weakness," "pleurisy," "Koch's bacillus infection," or even "K.B."—in fact, the disease is hedged about with almost as many polite evasions as a water-closet. Even the universal "T.B." is a stupid description for the use of laymen, especially in the common but oddly senseless form of "Smith is T.B." The evasive term is, of course, a symptom of taboo, but its continued use encourages the persistence and growth of this taboo. Moreover, the use of these evasions on certificates and elsewhere often means that the treatment of this disease is advertised by its failures and not by its successes.

Secondly, I suggest that by the use of the word "consumption" we swing from polite evasion to the opposite, and no more desirable, extreme of melodramatic exaggeration. Yet even modern textbooks use such sentences as "Most consumptives find . . ." in such a way that the patient with a small, arrested, and inactive lesion is included under a term which seems to describe a sort of walking incinerator. In spite of a certain pardonable academic snobbery in favour of the old-fashioned, is it not now time for humane as well as for scientific reasons to abandon this frock-coated phraseology?—I am, etc.,

Maidstone, Sept. 21. E. P. Edmonds.

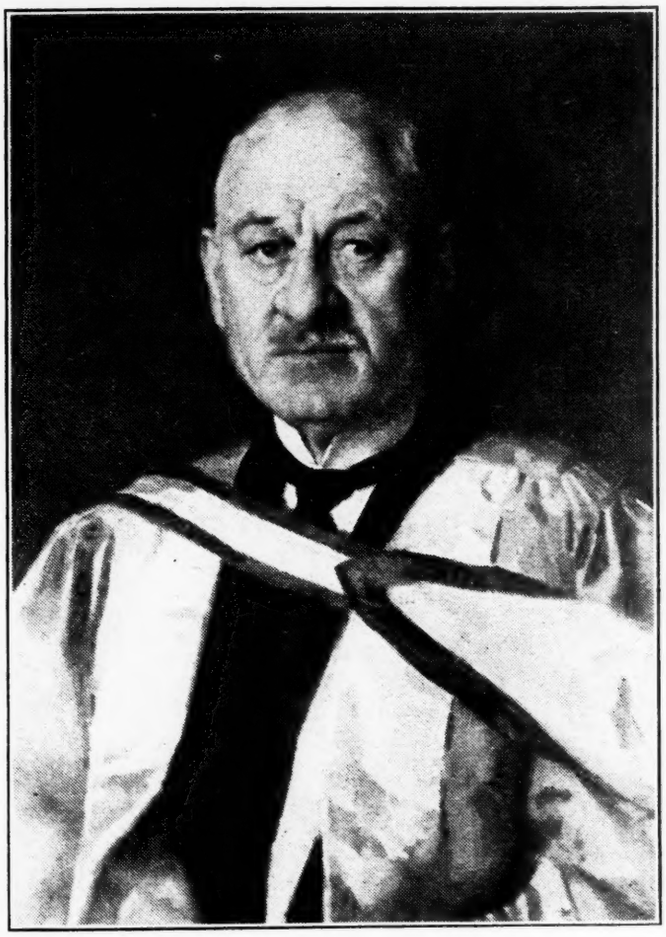
# Obituary

## SIR ANDREW MACPHAIL, M.D., C.M., LL.D.

Late Professor of History of Medicine, McGill University, Montreal

We much regret to announce the death in Montreal on September 23 of Sir Andrew Macphail, the distinguished Canadian who held the chair of history of medicine at McGill University for thirty-one years, and was known on both sides of the Atlantic as a writer of singular force and lucidity.

John Andrew Macphail came of Highland Scottish stock. He was born on November 24, 1864, at Inverairnie, Prince Edward Island, where his father, William Macphail, farmed in the Orwell district among Gaelic-speaking settlers. From Prince of Wales College in Charlottetown he entered McGill University and graduated B.A., continuing his studies in the medical school and supplementing them with a course at the London Hospital, where (in his own words) he observed operative surgery under the hand of Frederick Treves, "that first of modern English surgeons, at the time when he was perfecting the operation for perityphlitis, the term by which in those days appendicitis was described." He took the M.R.C.S.Eng. in 1889 and graduated M.D., C.M. at McGill in 1891; four years later he was appointed professor of pathology at the University of Bishop's College at Lennoxville, returning soon afterwards to Montreal as pathologist to the Western Hospital and the Protestant Hospital for the Insane. For ten years he held these posts and engaged in private practice, having meanwhile married the daughter of a wealthy citizen of Montreal.



From boyhood Andrew Macphail had had a strong literary bent, and as an impecunious medical student at McGill University he reported occasionally for the *Montreal Star*. Independent means and greater leisure allowed him to indulge further his gift for writing. In 1905–6 he published *Essays in Puritanism* and the *Vine of Sibmah*, and after his appointment as professor of history of medicine in 1906 he published further essays on political and philosophical subjects: he was also Editor of the *Canadian Medical Association Journal* for some time, and edited from Montreal a quarterly review, *The University Magazine*, to which the best Canadian writers contributed.

In August, 1914, Andrew Macphail at once volunteered for duty abroad; he served first in France with the Sixth Canadian Field Ambulance, and in the latter part of the war he was with the medical headquarters staff in London. For his services he received the honour of knighthood in 1918 and the O.B.E. soon afterwards. During the war he had compiled an anthology, *The Book of Sorrow*, and a memoir of his friend and colleague John McCrae, the brilliant Canadian physician, under the title of McCrae's famous poem *In Flanders Fields*. He returned to Canada to take up the duties of his chair, spending every summer on the farm in Prince Edward Island, where he delighted to entertain old friends. During the next few years he was engaged on the *Official History of the Canadian Forces in the Great War, 1914–19: The Medical Services*. In this admirably written book he had no hesitation about entering the arena of political controversy in order to emphasize the moral to be learnt from the difficulties with which the Canadian Medical Services had to contend in the earlier years of the war. It stood out among other works of the time by reason of its literary excellence, the vigorous style of the author, and the clear-cut lessons he taught. In 1926 he gave an address on American methods in medical education at the congress of the American College of Surgeons in Montreal, and the full text of this piece of writing, remarkable alike for its style and its outspokenness, appeared in the Educational Number of the *British Medical Journal* in the following year. Not long afterwards he wrote for the *Quarterly Review* a drastic analysis of the published diaries of Sir Henry Wilson, and this, with his essays on Colonel House and T. E. Lawrence, was republished in a book, *Three Persons*. In 1931 his last book, *The Bible in Scotland*, appeared, and the Royal Society of Canada awarded him the Lorne Pierce medal for outstanding merit in Canadian literature. For some years before then his eyesight had deteriorated and writing became more of an effort, but in 1933 he contributed to these columns an address on "The Source of Modern Medicine."

Sir Andrew Macphail among his friends was a man of great charm and a most instructive and pithy talker. Our portrait is from a copy of the painting by Alphonse Jongers in 1924, which Macphail gave to the late Editor of the *British Medical Journal*, Sir Dawson Williams, with whom he was on terms of warm friendship.

The sudden death of Dr. Frederick Thomas Alexander Lovegrove on June 24 in Perth saddened the whole of the medical profession in Western Australia. Dr. Lovegrove was universally admired and respected. He was the friend of every medical practitioner in the State, for he came into contact with all of them at frequent intervals in his capacity as Government Medical Officer. Up to within a few hours of his death he was engaged in his ordinary duties, and his sudden end was a shock to his family as well as to his colleagues. Dr. Lovegrove was born in 1875. He was educated at Merchant Taylor's School, Crosby, near Liverpool, and at University College, Liverpool, then part of Victoria University. Qualifying in 1898 with the diplomas M.R.C.S., L.R.C.P., he later took the M.B., Ch.B. He held resident posts at the Children's Hospital, Liverpool, and at the Royal Infirmary, and was Holt Scholar in Anatomy at the University. For a period he served as a ship's surgeon, and then came out in 1900 to Western Australia, where he had two uncles practising medicine, one of them being Principal Medical Officer and Commissioner of Public Health. Dr. Lovegrove entered into practice at Perth and Yarloop, but in 1902 he returned to England, where, after travelling on the Continent for some time, he went to sea again as ship's surgeon. Western Australia, however, called him back, and in 1906 he practised successively at Yarloop, Bremer Island, and Tambellup until the outbreak of the war. After four years' service, during which he attained the rank of lieutenant-colonel, he became, on his return to the State, O.C., No. 8 Australian General Hospital at Fremantle. Resuming private practice, he resided at Tambellup and Dumbleyung, until in 1928 he was appointed Government Medical Officer in connexion with the State Insurance Department. He is survived by a widow and four sons.

Mrs. Hester Dill Smith, who died on August 3 at Clogher, Co. Tyrone, was the daughter of the late Rev. W. A. Russell of Strabane and wife of Lieutenant-Colonel Henry Smith, C.I.E., M.D. Many old friends and fellow-students of hers in the British Isles, in India, and in the United States will remember affectionately a personality in which the stern Ulster Presbyterianism of her early environment was happily blended with innate gentleness, generosity, and courage. Hester Dill Russell decided early to become a medical missionary, and at the age of 20 began her student career at the London School of Medicine for Women and the Royal Free Hospital. She qualified M.B., B.Ch., B.A.O. in 1891, and joined the Church of Scotland Medical Mission at Poona under Dr. Letitia Barnard. Later she was transferred to Gujrat in the Punjab. There she met Captain Henry Smith of the I.M.S., who was also a native of Tyrone, and after completing her five years' service with the mission she resigned and they were married. After Captain Smith's transfer to Jullundur, and later to Amritsar, family duties did not allow Mrs. Smith to pursue a whole-time medical career. Her previous medical experience was, however, of great assistance to her husband in many ways, especially in following up the immense number of cases of cataract operated on by "Jullundur Smith." Their union was a particularly happy one, founded on mutual esteem, unity of spirit, and abiding affection.

Dr. John Walker of Paisley died recently at the age of 61. Dr. Walker was a student of St. Mungo's College, Glasgow, and qualified L.R.C.P., L.R.C.S.Ed., L.R.F.P.S. Glas. in 1903. He was in general practice in Paisley for over thirty-two years and was a member of the British Medical Association for almost as long. "A. J. D. W." writes: By the death of John Walker, Paisley has lost one of its best-known citizens. Dr. Walker built up a large practice by his devotion to his work and won the esteem and affection of his patients. He will be especially missed by the poorer section of the community, to which he was both physician and friend. For many years he had been on the outdoor staff of physicians of the Royal Alexandra Infirmary, Paisley. Among various organizations in which he was particularly interested were the Salvation Army and the Paisley Highlanders' Association. He took an active part in public life, having been returned for Paisley Town Council as the member for the Second Ward by an overwhelming majority in 1933—an indication of the esteem in which he was held—and he again won the seat in 1936. In December, 1937, he retired from the council owing to ill-health. Dr. Walker is survived by his wife and two sons.

The following well-known foreign medical men have recently died: Professor Max Kappis, director of the surgical clinic of Wurzburg University, aged 57; Professor Johannes Lange, director of the nerve clinic at Breslau University and president of the Association of South Eastern German psychiatrists and neurologists; and Dr. Alphonse Labbé, honorary professor at the Nantes School of Medicine.

## Universities and Colleges

### UNIVERSITY OF LONDON

#### University College

The following lectures will be given at University College, Gower Street, W.C.1, during the first term: Four lectures by Dr. Phyllis Tookey Kerridge on "The Physiology of Hearing and Speech" on Mondays, October 10, 17, 24, and 31, at 5 p.m.; five lectures by Dr. R. J. Lythgoe on "The Physiology of Vision" on October 13, 18, 20, 25, and 27, at 5 p.m.; three lectures by Dr. J. F. Danielli on "The Permeability of Membranes" on Mondays, November 7, 14, and 21, at 5 p.m. All the above lectures are open to the public without fee or ticket.

#### London (Royal Free Hospital) School of Medicine for Women

The following awards of scholarships for 1937–8 are announced: *St. Dunstan's Exhibition:* Kathleen N. Berger. *Isobel Thorne Scholarship:* Josephine M. Lord. *Special A. M. Bird Entrance Scholarship:* Vera J. Cutler. *Mabel Sharman Crawford Scholarship:* Jessica Mestel. *Sir Owen Roberts Memorial Scholarship:* Barbara J. H. Broadwood and Margaret V. Teichmann. *A. M. Bird Clinical Scholarship:* Mrs. B. J. Clymo. *Alfred Langton Scholarship:* Alison D. Wells. *Ellen Walker Bursary:* Anne Stephen. *Flora Murray Bursary:* Elsie E. Whatley. *Emma Beilby Bursaries:* Jean M. Holtzmann and Mary L. Mittell. *Special Bursaries:* Marjorie K. Cole and Inez Hewitt. *A. M. Bird Postgraduate Scholarship in Pathology:* Nora F. T. Crowley, L.R.C.P., M.R.C.S. *Mabel Webb and A. M. Bird Research Scholarship:* Marjorie V. N. Sudds, M.B., B.S., D.T.M. and H.

#### Royal Dental Hospital of London (School of Dental Surgery)

The prize distribution and conversazione of the Royal Dental Hospital of London (School of Dental Surgery) will be held at the Royal Dental Hospital on Tuesday, October 4, at 8 p.m. Mr. Herbert L. Eason will preside.

### UNIVERSITY OF LEEDS

The following candidates have been approved at the examinations indicated:

M.D.—Eugenie C. Illingworth, N. Wood.

M.B., Ch.B.—*(Part I):* N. K. Barber, F. Debney, R. G. Denniss, P. A. Dobb, J. H. Foxton, A. Greenwood, A. Markey, A. Percival, I. G. W. Pickering, Helen M. Secker, W. Sheffield, Beatrice F. Stephenson, P. H. Tordoff, T. R. Wilson, D. S. Young. *(Part II):* J. R. Acfield, T. E. Broadbent, D. Brook, A. B. Dick, A. F. A. Fairweather, H. T. Hardy, D. G. Huntly, E. Hyman, D. J. McCandlish, Marjorie Marquis, Kathleen V. Miller, J. Overton, C. T. Roberts, C. R. Robson, Dorothy E. Rowling, J. F. Scannell, J. L. Sharp, A. H. Snalam, I. S. Stewart, C. L. Summerfield, A. W. Taylor, J. P. Watson, K. B. Wood.

D.P.H.—R. G. Smithson, E. H. Tomlin, Marjorie M. Wilson.

The William Hey Gold Medal and the West Riding Panel Practitioners' Prize has been awarded to W. M. H. Shaw.

# The Services

## HONORARY PHYSICIAN TO THE KING

Major-General P. S. Mills, C.I.E., I.M.S., has been appointed Honorary Physician to the King.

## EFFICIENCY DECORATION OF THE TERRITORIAL ARMY

The King has conferred the Efficiency Decoration of the Territorial Army upon Lieutenant-Colonel and Brevet Colonel L. H. Taylor, Lieutenant-Colonel W. W. Hallchurch, Major E. E. Lightwood, Major P. Hickey, Major J. Cohen, and Major R. S. Creed.

## DEATHS IN THE SERVICES

Colonel Percy Charles Hutchison Strickland, Madras Medical Service (ret.), died at Clifton, Bristol, on September 4, aged 75. He was born at Kampti, in the Central Provinces, on August 14, 1863, the son of Captain William George Malcolm Strickland of the 49th Madras Infantry. He was educated at Dulwich College and St. Bartholomew's Hospital, and took the M.R.C.S. in 1886, the L.R.C.P.Lond. and L.S.A. in 1887, and also subsequently the D.T.M. at Liverpool in 1912. Entering the Indian Medical Service as surgeon on October 1, 1887, he attained the rank of colonel on May 25, 1914, and retired on August 19, 1920. He served in the Burma Campaign in 1889, and with the Wuntho Field Force, in the Mogaung Column, in 1891. From 1917 to 1919 he was Inspector-General of Civil Hospitals in Burma. He was a member of the British Medical Association for fifty-one years.

Colonel Henry Francis Cleveland, C.I.E., Bombay Medical Service (ret.), died suddenly at Blackheath on September 17, aged 74. He was born on November 30, 1863, at Bombay, and was educated at University College, London, and took the M.R.C.S.Eng., L.R.C.P.Lond., and the L.S.A. in 1888. He entered the Indian Medical Service as surgeon on September 30, 1889, became brevet colonel on January 1, 1911, colonel on October 1, 1918, and retired on October 25, 1922. He served on the North-West Frontier of India in the campaigns of 1897-8; on the Malakand (medal with clasp), and in Tirah (clasp); in the China War of 1900 (medal); and in the war of 1914-19 in Afghanistan and on the North-West Frontier in 1919, when he was mentioned in dispatches in the *London Gazette* of August 3, 1920. He was appointed Deputy Director-General of the Indian Medical Service on November 1, 1916, and from October, 1917, to January, 1918, he officiated as Director-General. He received the C.I.E. on January 1, 1918. He was honorary surgeon to the Viceroy of India from 1913 to 1918. His wife was Kathleen, daughter of the late G. Rodway Swinhoe of Swinton, and he had one daughter.

Lieutenant-Colonel Richard Harris Hall, R.A.M.C. (ret.), died on July 12, aged 75. He was born at Blackrock, County Cork, on May 26, 1863, was educated at Queen's College, Cork, and graduated as M.D., M.Ch., and M.A.O. in the Royal University of Ireland in 1883. Entering the Army as surgeon on May 30, 1885, he became lieutenant-colonel after twenty years' service, and retired on May 26, 1918. He served in Burma in 1887, and received the frontier medal with a clasp.

Lieutenant-Colonel Matthew Corry, I.M.S. (ret.), died at Hove on September 19, aged 64. He was born on November 10, 1873, and was educated at Edinburgh University, where he graduated M.B., C.M. in 1896. He proceeded M.D. in 1911. For a time he acted as demonstrator of anatomy at St. Andrews University. He entered the Indian Medical Service as lieutenant on January 27, 1900, became lieutenant-colonel on July 27, 1919, and retired on November 10, 1928. Most of his service was spent in the Punjab in civil employ, which he entered in May, 1902, serving as plague medical officer and later as civil surgeon. From May, 1917, to August, 1920, he was on military duty, and after his return to civil work in October, 1920, he was appointed lecturer in midwifery and medical jurisprudence in the medical school at Amritsar. He had been a member of the British Medical Association for thirty years.

# Medical News

We are asked by the Medical Insurance Agency to inform the profession, many of whom have made urgent inquiries during the past few days of crisis, that no insurance company will accept any risk arising from air bombardment, etc., in accordance with a decision reached many months ago by a unanimous conference of the offices. Presumably before long—possibly even before this appears in print—the Government will announce its plans (as was done in 1914) for covering these risks. Until that happens the M.I.A. has necessarily no useful information to give.

Parliament reassembled on September 28 for a special sitting to consider the European crisis. The House of Lords adjourned immediately. In the House of Commons Mr. Chamberlain reviewed recent negotiations and announced that he had been invited to meet Herr Hitler at Munich on the following day. The House then adjourned till October 3. No emergency legislation was introduced on September 28, and the only question asked concerned compensation for damage by air raids. Sir John Simon replied that the Government was considering a comprehensive scheme.

In our advertisement columns this week applications are invited by the Royal College of Surgeons of Edinburgh for the post of Conservator of the Museum and Director of Postgraduate Studies, tenable for five years with eligibility for reappointment, at an initial salary of £1,000 per annum.

The seventeenth Annual Congress of Anaesthetists, which will be held in New York from October 17 to 21 during the "Congress of Surgeons' Week," will comprise a joint session of the Associated Anaesthetists of the United States and Canada, the International Anaesthesia Research Society, the International College of Anaesthetists, the Eastern Society of Anaesthetists, and the Mid-Western Association of Anaesthetists. An address will be delivered on the life and work of Sir Frederic Hewitt, and special anaesthesia clinics and laboratory demonstrations will be arranged. One meeting will be devoted to current researches in anaesthesia and analgesia, and the newer methods in anaesthetics will be demonstrated.

The August number of *Discovery* contains a review of Professor A. J. Clark's pamphlet, *Patent Medicines*, and articles on nutrition and vitamins. In the June number there was an article by Professor J. A. Ryle on "The History of Research on Digestion and Pernicious Anaemia." *Discovery* is now edited by Mr. C. P. Snow, Ph.D., and in its new form is an attractive and interesting popular scientific periodical.

### *Arrangements Cancelled*

The annual dinner of St. Mary's Hospital Medical School, announced to be held at Claridge's on October 1, has been cancelled: also the special postgraduate course which was to have been held from September 29 to October 2. It has been decided to cancel the arrangements made for this week end by the Charing Cross Hospital Medical School, which included the prize-giving, annual dinner, and postgraduate course. The annual dinner of St. George's Hospital Medical School arranged for October 1 has also been cancelled, and the old students' dinner of St. Thomas's Hospital Medical School, arranged for October 7.

In present circumstances it has been decided to cancel the Health Conference which was to have been held under the joint auspices of the Department of Health for Scotland and the Ministry of Health at the Empire Exhibition in Glasgow on Friday of this week. The two-day conference of the Central Council for Health Education, which was to have preceded it, has also been cancelled.

The conference of the British Health Resorts Association at Torquay, which was to have opened on Friday, has been postponed.

No. 37.

# INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended September 17, 1938.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland. Median values for the last 9 years for (a) and (b).

*Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for:* (a) The 126 great towns (124 in 1937) in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

| Disease | 1938 | | | | | 1937 (Corresponding Week) | | | | | 1929-37 (Median Value Corresponding Weeks) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (a) | (b) | (c) | (d) | (e) | (a) | (b) | (c) | (d) | (e) | (a) | (b) |
| Cerebrospinal fever | 17 | 1 | 8 | 1 | — | 10 | 3 | 4 | 1 | — | | |
| Deaths | | — | 2 | | | | 3 | 1 | | | | |
| Diphtheria | 1,213 | 159 | 143 | 54 | 28 | 1,308 | 166 | 191 | 44 | 23 | 1,148 | 173 |
| Deaths | 21 | 3 | 2 | — | — | 27 | 6 | 5 | 3 | — | | |
| Dysentery | 40 | 13 | 25 | | — | 32 | 12 | 11 | | — | | |
| Deaths | | | | — | — | | | | — | — | | |
| Encephalitis lethargica, acute | 6 | 1 | — | | — | 5 | — | — | | — | | |
| Deaths | | — | | | | | 1 | | | | | |
| Enteric (typhoid and paratyphoid) fever | 45 | 3 | 8 | 11 | — | 39 | 5 | 10 | 7 | 2 | 60 | |
| Deaths | 5 | — | — | — | — | 2 | — | — | — | — | | |
| Erysipelas | | | 44 | 8 | 6 | | | 76 | 6 | 3 | | |
| Deaths | | — | | | | | — | | | | | |
| Infective enteritis or diarrhoea under 2 years | | | | | | | | | | | | |
| Deaths | 56 | 11 | 7 | 7 | 7 | 47 | 9 | 28 | 8 | 7 | | |
| Measles | | | 19 | | 3 | | | 11 | | 1 | | |
| Deaths | 3 | 2 | 1 | — | — | 3 | 1 | — | — | — | | |
| Ophthalmia neonatorum | 94 | 10 | 35 | | 2 | 94 | 7 | 43 | | — | | |
| Deaths | | | | | | | | | | | | |
| Pneumonia, influenzal† | 445 | 33 | 7 | | 8 | 392 | 30 | 1 | 1 | 2 | 441 | 37 |
| Deaths (from influenza) | 15 | 6 | — | 1 | 2 | 17 | 1 | 3 | — | 1 | | |
| Pneumonia, primary | | | 155 | 4 | | | | 141 | 4 | | | |
| Deaths | | 9 | | — | 4 | | 10 | | 15 | 5 | | |
| Polio-encephalitis, acute | 7 | 2 | | | | 2 | 1 | | | | | |
| Deaths | | — | | | | | — | | | | | |
| Poliomyelitis, acute | 76 | 7 | 11 | | — | 54 | 18 | 1 | | — | | |
| Deaths | | — | | | | | 1 | | | | | |
| Puerperal fever | 4* | 4 | 15 | 3 | — | 39 | 8 | 15 | 2 | — | | |
| Deaths | | — | | | | | — | | | | | |
| Puerperal pyrexia | 171 | 18 | 14 | | — | 115 | 11 | 30 | | — | | |
| Deaths | | | | | | | | | | | | |
| Relapsing fever | — | — | | | — | — | — | — | | — | | |
| Deaths | | | | | | | | | | | | |
| Scarlet fever | 1,683 | 131 | 355 | 63 | 73 | 1,868 | 139 | 393 | 65 | 57 | 1,750 | 260 |
| Deaths | 2 | — | 1 | — | — | 4 | 1 | 2 | — | — | | |
| Small-pox | — | — | — | | — | — | — | — | | — | | |
| Deaths | — | — | | — | — | — | — | | — | — | | |
| Typhus fever | — | — | — | — | — | — | — | — | — | — | | |
| Deaths | | | | — | — | | | | — | — | | |
| Whooping-cough | | | 117 | | 13 | | | 43 | | 4 | | |
| Deaths | 8 | 1 | 4 | — | 1 | 12 | 5 | — | 1 | — | | |
| Deaths (0-1 year) | 289 | 46 | 48 | 23 | 9 | 277 | 39 | 67 | 30 | 18 | | |
| Infant mortality rate (per 1,000 live births) | 48 | 38 | | | | 47 | 32 | | | | | |
| Deaths (excluding stillbirths) | 4,100 | 786 | 510 | 154 | 119 | 3,753 | 707 | 591 | 171 | 115 | | |
| Annual death rate (per 1,000 persons living) | 10.1 | 10.0 | 10.4 | 10.4 | 10.5 | 9.3 | 8.9 | 12.1 | 11.7 | 10.2 | | |
| Live births | 6,230 | 1,118 | 763 | 387 | 209 | 6,318 | 1,217 | 884 | 290 | 215 | | |
| Annual rate per 1,000 persons living | 15.3 | 14.2 | 15.5 | 26.2 | 18.5 | 15.6 | 15.3 | 18.1 | 19.8 | 19.1 | | |
| Stillbirths | 250 | 31 | | | | 253 | 40 | | | | | |
| Rate per 1,000 total births (including stillborn) | 39 | 27 | | | | 39 | 32 | | | | | |

* After October 1, 1937, puerperal fever was made notifiable only in the administrative county of London.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

# EPIDEMIOLOGICAL NOTES

### Acute Poliomyelitis

Notifications for poliomyelitis in England and Wales were 76, an increase of 3 on the previous week, and in London 7, representing an increase of 2. Notifications of more than one case were reported from: Portsmouth 4, and 2 each from Aberayron, Accrington, Braintree (Rural 1), Hull, Ipswich, Leamington, Leyton, Llandilo, Ruthin, and Ventnor. The 7 London cases were distributed thus: Hackney, Hammersmith, Wandsworth, 2 each, Islington 1. During the four-week period ended September 10 the number of cases notified of poliomyelitis and polio-encephalitis was 313 compared with 221 for the previous four-week period and 167 for the corresponding period last year. In Germany during the week ended September 3, 365 cases were reported as against 319 in the previous week. The areas chiefly affected were: Cologne district 112 (89), Wiesbaden district 23 (15), Frankfort district (Prussia) 15, Württemberg 47 (55), Bavaria 31 (18), Saxony 24 (19). In Holland a decline of poliomyelitis was observed in the week ended September 10; from 67 to 58 for the whole country, and from 37 to 31 in the Province of South Holland. Five cases were reported from the Hague district, 6 in Rotterdam district, and 4 in Waddinxveen district (South Holland).

### Enteric Fever

In England and Wales notifications of enteric fever increased from 36 to 45, and deaths in the 126 Great Towns rose during the week from 4 to 5. More than one case was notified in: Coventry 10 (1), London 3 (2)—Stepney 2, Woolwich 1—and 2 each in Liverpool, Preston, and Whitstable.

### Diphtheria and Scarlet Fever

Diphtheria continues to increase in prevalence in England and Wales, while a slight decline was noted in Scotland during the week. The chief centres in which increases were recorded are: London 159 (146), Birmingham 36 (31), Easington 18 (0), South Shields 16 (15), Prescot 13 (2), Cardiff 12 (8), Stoke 12 (6), Plymouth 10 (3). A small rise in notifications of scarlet fever in England and Wales, 1,683, as against 1,625, in which London has shared, 131, as against 121, has been recorded for the week. Noteworthy increases were: Sheffield 31 (19), Leeds 36 (32), Nottingham 24 (17), Cardiff 14 (9), Carlisle 13 (7), Portsmouth 13 (11), Heston and Isleworth 10 (5).

### Measles and Whooping-cough

Three deaths from measles were recorded in the 126 Great Towns of England and Wales, compared with 5 in the previous week, 2 in London and 1 in Nottingham. In Scotland notifications fell from 37 to 19, the chief centres affected being Glasgow 11 (12), Dundee 4 (6), and Kirkcaldy 3 (3). Of the 8 deaths from whooping-cough in the 126 Great Towns one occurred in each of the following: London, Barnsley, Blackburn, Bradford, Gateshead, Newcastle, Sheffield, Walsall. In Scotland a considerable fall in notifications was recorded, 117 compared with 232, but 4 deaths (all in Glasgow) represented an increase of 1 over the previous week.

### Cholera

A report from one of the League of Nations anti-cholera units in China states that in the Hunan Province during the first eight months of 1938 there were 4,080 cases with 1,764 deaths. During June and July 16,805 cases with 6,103 deaths were reported in Eastern Kwantung, chiefly in Chaoyang district 5,063, Lufong 4,454, and Haifong 624. The southern part of the Kwangtung Province suffered less, as shown by a decline in the figures for Canton, Macao, and Hong Kong. Cholera has appeared in Inritsu, about 190 miles east of Dairen, and has spread to towns and districts to the north-east. By September 17, 35 cases with 20 deaths had been recorded. In British India the disease continues to decline. In the Central Provinces, which was the chief centre affected, there were reported for the week ended September 17 5,295 cases with 1,794 deaths, compared with 5,486 cases and 2,361 deaths in the previous week.

### Plague

The incidence of plague in British India has fallen considerably compared with recent years. The fall was particularly marked in the Central Provinces (12,611 in 1936-7 to 5,477 in 1937-8), and in the United Provinces 10,684 to 5,253, which were the principal foci of the disease, representing 46 per cent. of the total for the whole of India including Burma. In Burma a small increase is recorded, 2,845 compared with 2,503, mainly due to the epidemic of January and February of this year. In Manchuria from May 1 to August 31 a total of 286 cases with 228 deaths was recorded. The areas chiefly affected and in which spread has occurred since the beginning of the autumn are: Ch'angling Prefecture, Kirin Province, 72 cases, 63 deaths; Kuoerhlossu Banner, Kirin Province, 52 cases, 42 deaths; K'ait'ung Prefecture, Fengtien Province, 46 cases, 24 deaths.

# Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to The Editor, British Medical Journal, B.M.A. House, Tavistock Square, W.C.1.

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## QUERIES AND ANSWERS

### Treatment of Buccal Ulcers

Dr. R. E. Isaac (Whetstone, N.) writes: I would be grateful for suggestions for treatment in the following case. A married woman, age 32 years, has had ulcers in the mouth for two years. Blood count originally showed a very slight secondary anaemia, but is now normal after treatment with iron, campolon, and anahaemin. All teeth have been extracted. Local treatment already tried includes applications of carbolic acid, copper sulphate, silver nitrate, glycerin, tannic acid, resorcin in glycerin, and mouth washes of all types, of which dettolin gives most relief.

### Regression after Psycho-analytical Treatment

"J. D." would like to hear of any experience doctors may have had with persons who have undergone Freudian psycho-analysis and in whom regression has occurred, so that they have lapsed back into their former state.

### Wasp Stings

"A. H. D." writes: Can any form of inoculation be given against wasp stings? The case is that of a woman working in a fruit shop, who, if stung by a wasp anywhere, collapses immediately. I have seen her in this state, unconscious, almost pulseless, and with every sign of profound shock. As she is always liable to stings she naturally wishes to know whether anything can be done to render her immune. I would be grateful for any suggestions.

### Treatment of Superficial Glossitis

Dr. C. A. HUGHES (Liverpool) writes: In answer to the query of "O. M. N." (*Journal*, September 10, p. 604) I would advise that the surface areas on the tongue or inside the mouth, wherever sore, be dabbed often during the day with pellets of cotton-wool soaked in the following: glycerin boracis, 1 oz.; tinct. myrrhae, 1 drachm; with liq. hydrarg. perchlor. to 2 oz.

### Cleaning Slides for Blood Films

Dr. B. R. SANDIFORD (Cairo) writes in reply to "J. S. M." (*Journal*, August 27, p. 480): May I say that there is only one really efficient method of cleaning slides—namely, taking the slide between forceps and roasting it well in the Bunsen flame. The efficacy of this or any other method may be simply tested by observing the ease with which a loopful of water spreads on the slide.

Dr. ALISTAIR FRENCH (Greenford) writes in reply to "J. S. M." (*Journal*, August 27, p. 480): May I suggest a brisk rub with a piece of tissue paper and a spot or two of (methylated) ether. Incidentally, the uses of the latter in the surgery are manifold. (1) It is invaluable for cleaning dirty wounds, being a grease solvent, a vasodilator—thus increasing bleeding and washing dirt out of the wound—and an antiseptic. (2) As a rubber solvent it will remove rubber adhesive plaster, elastic or otherwise, without pain, and prevents dirty sticky marks being left on the skin. (3) It will dissolve the sebaceous grease on the skin, and thus facilitates the treatment of boils, etc., with elastoplast, and increases the rate of absorption of any drug given by inunction (also by its vasodilator effect). (4) It is the best skin sterilizer for use before vaccination or hypodermic injection.

### Sensitivity to Sunlight

Dr. IVOR RADNOR (Birmingham) writes: I read with interest the annotation on sensitivity to sunlight in the *Journal* of August 27. Could anyone tell me of any treatment for a person who is very sensitive to solar rays and dare not be exposed to the rays of the sun in the summer?

### Treatment of Pruritus Ani

"J. M." writes: I have a patient, a male, who is suffering from pruritus ani, which is quite unaffected by local applications. I have tried injections of novocain without success. I am contemplating the injection of 95 per cent. alcohol, but before undertaking this I would be grateful for any suggestions as to recent successful forms of treatment.

### Control of Bulimia

Dr. NORA L. KEEVIL would be grateful for suggestions as to treatment of the following case: A man of 75 who is now in an advanced stage of paralysis agitans has, apart from the usual symptoms, developed a persistent and most distressing feeling of hunger, following an attack of shingles three months ago. Every type of antacid has been tried, as well as glucose D, charcoal, barley sugar, codeine, pilocarpine, atropine, etc., but he is still obliged to eat every one and a half hours throughout the day, and at least two or three times during the night.

### Income Tax

*Stock of Materials, Drugs, etc.*

"R. B. R." explains that the inspector of taxes dealing with his firm's liability is pressing for an annual valuation of "all materials, drugs, and instruments" belonging to the firm, and asks whether such a request can be enforced.

*** So far as the calculation of the year's earnings is concerned the valuation of the stock of drugs, etc., will not affect the result except to the extent to which the valuation varies from year to year. If, for instance, the stock goes up by £100 it implies that during the past year £100 more has been deducted as an expense than was incurred in earning the profits *of that year*, and of course the converse must have occurred if the stock has gone down. If, therefore, our correspondent is in a position to show, or at least to affirm, that the practice stock remains more or less at a constant figure, we think that the inspector of taxes might waive his request, or, alternatively, that he would not be supported therein if "R. B. R." appealed to the Commissioners—local or special—on the point.

## LETTERS, NOTES, ETC.

### Medical Evidence at Inquests

Dr. J. B. ALEXANDER (London, E.17) writes: The letters of Dr. A. Lankester and Dr. J. J. Davis in the *Journal* of September 10 (p. 596) have stimulated me to record my somewhat similar experience. I had been treating a middle-aged woman for some months for extreme depression. One afternoon I received an urgent call to her house, and found the house full of gas and the patient lying on the scullery floor. The door of the gas oven was open, but the husband had turned off the gas. I sent him to fetch a policeman, opened all the windows and doors, dragged the woman into another room, and administered artificial respiration for nearly half an hour, assisted some of the time by oxygen supplied by the local fire brigade. My efforts, however, were ineffective. The next morning the coroner's officer rang me up for brief particulars of the woman's past and of the circumstances of her death. That is the last I heard of the business. The local press gave a full account of the inquest, at which the policeman took the entire credit for all the efforts at resuscitation. I was not mentioned.

Dr. MEYER J. LANGE (London, S.E.1) also writes: I was resident at a Croydon hospital over a period of two years, during which time I saw a considerable number of patients brought in dead or dying very soon after admission. In the majority of these death was obviously due to natural causes, such as cardiac failure, cerebral haemorrhage, etc. In these cases the house officer concerned, who examined the case and certified death and in addition notified the coroner, was never even requested to attend the inquest. Often the body was removed to a neighbouring institution, where the necropsy was performed by an "outside" medical man. Subsequent information was gleaned from the local newspaper. The only occasions when the house officer was asked to perform the post-mortem examination or attend the inquest were in connexion with accident cases, where death was due to multiple injuries. Might I add that a competent full-time pathologist was attached to the hospital, who was always most willing to give advice and assistance in the post-mortem room.

### Blood Transfusion Service

The annual report of the Blood Transfusion Service, 1937, records a considerable increase in the number of calls during the last four months of the year. During this period there were 2,018 calls, comparing with 1,683 for the corresponding months of 1936. An analysis of the net cost per case is of interest. The total figure of eight shillings and sixpence is made up as follows: donors' expenses, 10d.; salaries and insurance, 2s. 7d.; office rent, lighting, and heating, 4½d.; printing, postage, telephones, and telegrams, 1s. 5d.; research work, 2s.; cost of sera, bandages, propaganda, and miscellaneous, 1s. 3½d. An International Congress, attended by representatives of twenty-two nations, was held at Paris in September–October. Useful contacts were made with foreign delegates, and in several cases an interchange of forms and publications was arranged. Problems of blood transfusion and storage aroused especial interest, but it is stated that little practical information was obtained. The method in vogue in the U.S.S.R. of extracting blood from freshly deceased cadavers was described to the congress; also the technique of extraction from living donors in Spain, where it is the practice to mingle the blood of six different persons in order to "average out" minor individual incompatibilities. The report deprecates the sensational manner in which the subject of blood transfusion is treated by a large section of the lay press. This is said not only to impede recruiting of donors but also to deter friends and relatives of patients from giving consent to the operation. Among captions quoted are "Curate gives health for child," "Blood donor dies in poverty," "Policemen become anaemic through giving blood," and "Saved life—lost job."

### Faecal Impaction

"ROBERTO" writes with reference to recent letters on faecal accumulation in the rectum: The injection of an ounce of 10 vol. peroxide of hydrogen, by disintegrating the scybalum and by rapid increase in gaseous volume, gives sometimes wondrous relief. *Experto crede.*